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KEY TO DAVIES'  
UNIVERSITY ARITHMETIC.

Educ T 118.59.321

Box, No.

## ESSEX INSTITUTE.

PRESENTED BY

*George W. Patten*

### CHAPTER V.

### OF THE LIBRARY.

The Library Committee shall divide the books and other articles belonging to the Library into three classes, namely: (a) those which are not to be removed from the building; (b) those which may be taken from the halls only by written permission of three members of the committee, who shall take a receipt for the same and be responsible for their safe return; (c) those which may circulate under the following rules.

Members shall be entitled to take from the library one folio, or two quarto volumes, or four volumes of any lesser fold, with the plates belonging to the same, upon having them recorded by the Librarian, or Assistant Librarian, and promising to make good any damage they sustain, while in their possession, and to replace the same if lost, or pay the sum fixed by the Library Committee.

No person shall lend any book belonging to the Institute, excepting to a member, under a penalty of one dollar for every such offence.

The Library Committee may allow members to take more than the allotted number of books upon a written application, and may also permit other persons than members to use the Library, under such conditions as they may impose.

No person shall detain any book longer than four weeks from the time of its being taken from the Library, if notified that the same is wanted by another member, under a penalty of five cents per day, and no volume shall be retained longer than three months at one time under the same penalty.

The Librarian shall have power by order of the Library Committee to call in any volume after it has been retained by a member for ten days.

On or before the first Wednesday in May, all books shall be returned to the Library, and a penalty of five cents per day shall be imposed for each volume detained.

Labels designating the class to which each book belongs shall be placed upon its cover.

No book shall be allowed to circulate until one month after its reception.

NORTHEND'S LITTLE ORATOR ..... 0.80

NORTHEND'S NATIONAL ORATOR ..... 0.75

NORTHEND'S ENTERTAINING DIALOGUES ..... 0.75

NATION ..... 1.00

HIGH SCHOOL ..... 1.00

H

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OF  
**Standard School Books,**

PUBLISHED BY.

**A. S. BARNES & BURR, NEW YORK.**

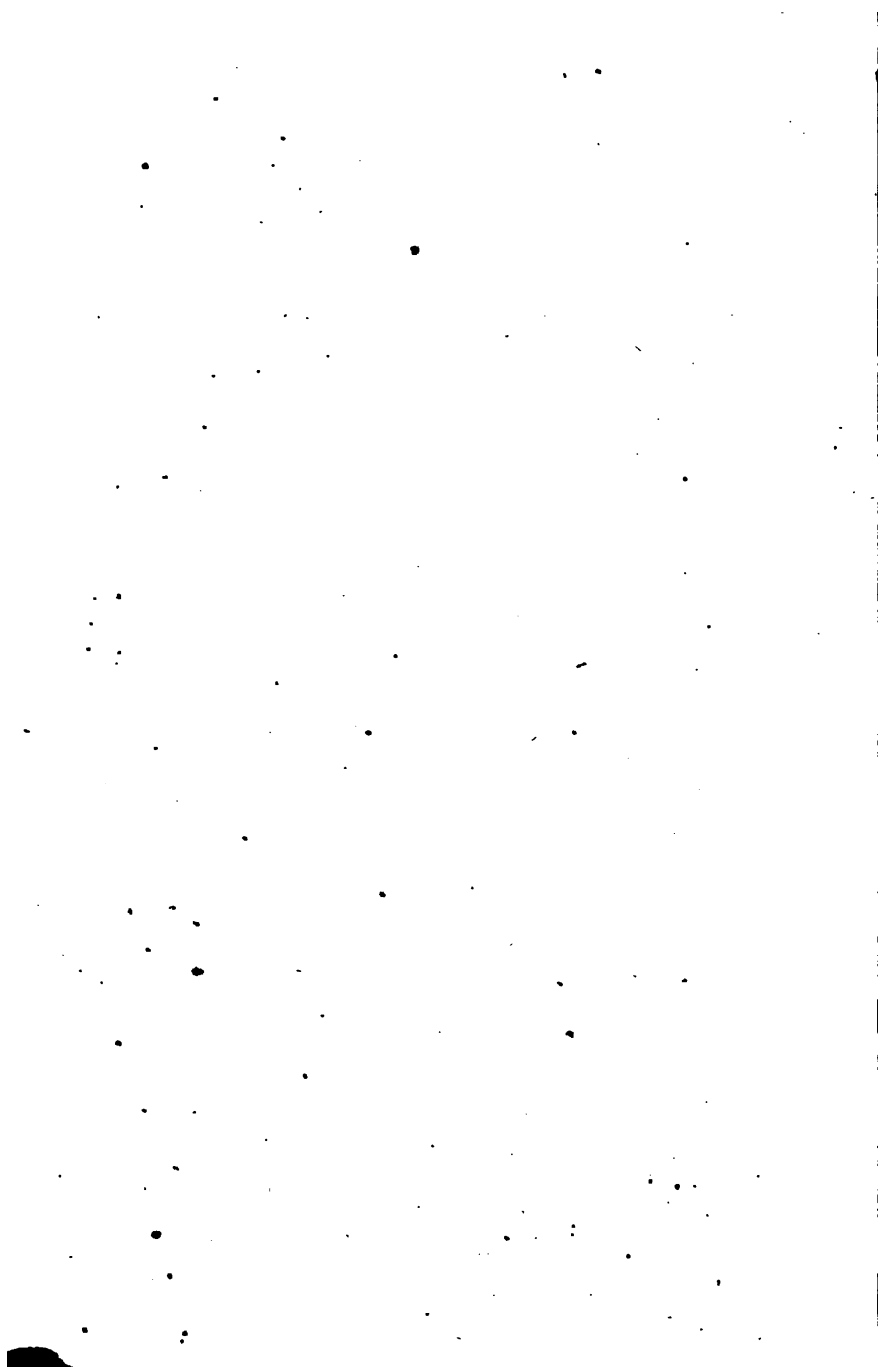
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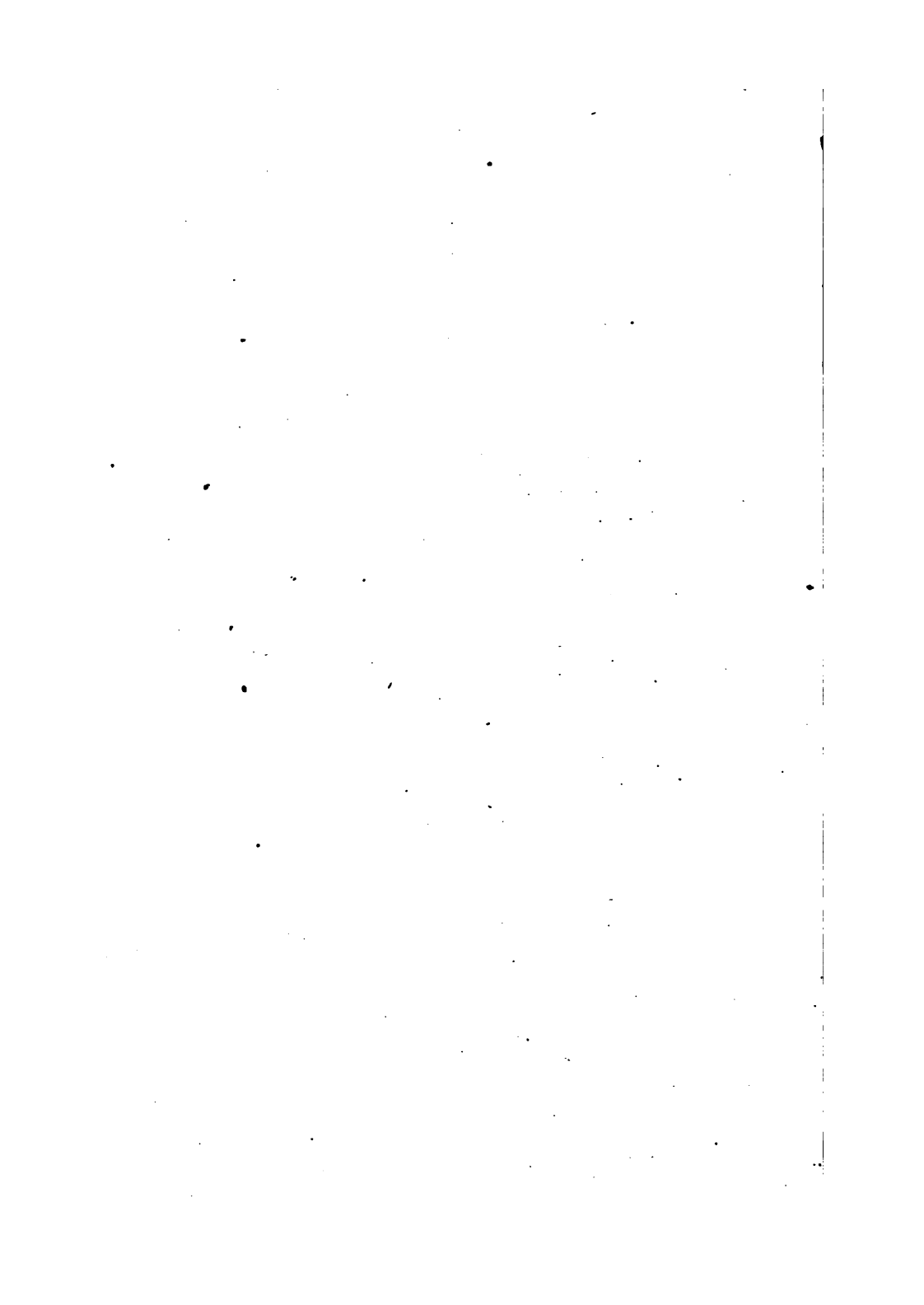
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3 2044 096 996 665





°  
KEY

TO

DAVIES'

UNIVERSITY ARITHMETIC,

EMBRACING

THE ANSWERS, AND A FULL ANALYSIS AND SOLUTION  
OF THE DIFFICULT QUESTIONS.

VALUABLE ONLY TO THOSE WHO LABOR.

NEW YORK:

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1859.

Edna T 118, 57, 321

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GIFT OF

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## PREFACE.

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It is not yet a settled question whether a Key to a Mathematical work is an aid or a hindrance. The diversity of opinion which exists on this point doubtless arises from the different *uses* to which a Key is applied. A Key should never be used to supersede investigation and labor; but always to turn the former into right channels, and to make the latter more available and effective.

How to study—how to investigate—how to labor, and how to teach, are the great questions; and it is these which a Key should answer.

It is not results alone that give value to a Key; but it is the explanation of methods—the examination of principles applied in the solution of problems, and a general and minute analysis of such questions as contain within themselves the germs of science.

It is also the province of a Key to lessen the *mechanical labor* of Teaching. Amid the various and complicated duties of the school-room, the teacher can

scarcely find time to work out every question on the slate or blackboard. In the Key he not only finds the best forms of analysis, but also the best arrangement of the work to be done ; hence, he has a standard to which the work of his pupils should conform. He has only to guard against the danger of permitting his Key to become a *substitute* for a full and thorough investigation on his part, and he will avail himself of the general analysis and the best practical methods, without at all interfering with the independent operations of his own mind.

Great care has been taken to make a full and complete analysis of every question whose solution presents a new principle ; and so to construct the analysis as to make that principle most apparent. It is believed that all the important forms of analysis have been given, and that all the classes of practical questions have been considered.

FISHKILL LANDING, }  
July, 1856. }

# KEY.

## ROMAN NOTATION.

<i>Ans.</i> <sup>(1)</sup> XVI.	<sup>(2)</sup> XIV.	<sup>(3)</sup> XVIII.	<sup>(4)</sup> LXIX.
<i>Ans.</i> <sup>(5)</sup> LXXVIII.	<sup>(6)</sup> CXV.	<sup>(7)</sup> CCCCIX.	<sup>(8)</sup> DCCLL.
<i>Ans.</i> <sup>(9)</sup> MLX.	<sup>(10)</sup> MMXCI.	<sup>(11)</sup> DLXIX.	<sup>(12)</sup> DCCXLV.
<i>Ans.</i> <sup>(13)</sup> DCCCCLXI.	<sup>(14)</sup> DCXCIX.	<sup>(15)</sup> DCCCCLVII.	
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<i>Ans.</i> <sup>(19)</sup> MDCCCXLVII.	<sup>(20)</sup> MMDXX.		

## ARABIC NOTATION.

<i>Ans.</i> <sup>(1)</sup> 7	<i>Ans.</i> <sup>(2)</sup> 80	<i>Ans.</i> <sup>(3)</sup> 9000	<i>Ans.</i> <sup>(4)</sup> 93
<i>Ans.</i> <sup>(5)</sup> 961	<i>Ans.</i> <sup>(6)</sup> 7408	<i>Ans.</i> <sup>(7)</sup> 897,021	<i>Ans.</i> <sup>(8)</sup> 86,029,430
<i>Ans.</i> <sup>(9)</sup> 4,328,021,063	<i>Ans.</i> <sup>(10)</sup> 967,040,932	<i>Ans.</i> <sup>(11)</sup> 30,430,208,123	

( 12 )                      ( 13 )                      ( 14 )  
*A.* 360,030,702,010    5,800,006,000,812    75,605,070,905,008

( 15 )                      ( 16 )  
*Ans.* 904,000,800,200,720    *Ans.* 6,000,900,704,098,020

( 17 )                      ( 18 )  
*Ans.* 80,510,006,040,900,040,900    *Ans.* 6,050,900,001

( 19 )                      ( 20 )  
*Ans.* 987,654,321,012,345,678    *Ans.* 208,104,111,001,111,111

## NUMERATION.

( 1 )  
 Ninety-seven. *Ans.*

( 2 )  
 Three hundred and twenty-six. *Ans.*

( 3 )  
 Three thousand three hundred and two. *Ans.*

( 4 )  
 Sixty-five thousand and forty-two. *Ans.*

( 5 )  
 Seven hundred and forty-two thousand, six hundred and four.

( 6 )  
 Thirty-two millions, forty-five thousand, six hundred and seven.

( 7 )  
 Ninety millions, four hundred sixty-four thousand, two hundred and thirteen. *Ans.*

( 8 )

Forty-seven millions, three hundred sixty-four thousand, two hundred and ninety-one. *Ans.*

( 9 )

Four billions, thirty-seven millions, nine hundred and two thousand, one hundred and sixty-nine. *Ans.*

( 10 )

Ninety-one millions, forty-six thousand, three hundred and two.

( 11 )

Seven hundred eighty-four millions, two hundred thirty-six thousand, seven hundred and four. *Ans.*

( 12 )

Seven billions, four hundred and three millions, twenty-six thousand, and fifty-four. *Ans.*

( 13 )

• Twenty-one billions, seven hundred and four millions, eighty thousand, four hundred and ninety-five. *Ans.*

( 14 )

Twenty-one billions, eight hundred ninety-six millions, seven hundred and twenty thousand, four hundred and twenty-one.

( 15 )

Eight trillions, one hundred and forty billions, two hundred and ninety millions, three hundred and eight thousand and ninety-seven. *Ans.*

( 16 )

Eight trillions, five hundred and four billions, six hundred and eighty millions, four hundred and sixty-seven thousand, and twenty-three. *Ans.*



( 17 )

Ninety trillions, four hundred and three billions, forty millions, seven hundred and twenty thousand, one hundred and fifty-six. *Ans.*

( 18 )

One hundred and seventy-two trillions, three hundred and four billions, seven hundred and thirty-six millions, eight hundred and ninety-three thousand, two hundred and ten. *Ans.*

( 19 )

Thirty trillions, four hundred and sixty-seven billions, two hundred and fourteen millions, three hundred and two thousand, seven hundred and four. *Ans.*

( 20 )

One hundred and sixty-seven trillions, three hundred and twenty billions, four hundred and ten millions, three hundred and forty-one thousand, two hundred and four. *Ans.*

( 21 )

Two quadrillions, one hundred and sixty-four trillions, thirty-two billions, one hundred and eighty-nine millions, seven hundred and sixty-five thousand, four hundred and twenty-one.

( 1 )  
*Ans.* 621

( 2 )  
*Ans.* 5,702

( 3 )  
*Ans.* 8,001

( 4 )  
*Ans.* 10,406

( 5 )  
*Ans.* 65,029

( 6 )  
*Ans.* 40,000,241

( 7 )  
*Ans.* 59,000,310

( 8 )  
*Ans.* 12,111

( 9 )  
*Ans.* 300,001,006

( 10 )  
*Ans.* 69,003,000,211

( 11 )  
*Ans.* 47,000,069,000,465,207

( 12 )  
*Ans.* 800,000,000,000,429,006,009

( 13 )

*Ans.* 95,000,000,000,000,089,089,306

( 14 )

*Ans.* 6,000,000,451,065,047,104

( 15 )

*Ans.* 999,065,841,411

( 16 )

*Ans.* 470,040,000,000,000,000,000,004,006,204

( 17 )

*Ans.* 65,000,800,000,750,751,975,310

( 1 )

*Ans.* 2 ; 7

( 2 )

*Ans.* 7 ; 3

( 3 )

*Ans.* 1 ; 7

## REDUCTION.

( 6 )

*Ans.* 42600 cents, 426000 mills.

( 7 )

*Ans.* 36860 cents.

( 8 )

*Ans.* 8 dollars 75 cents.

( 9 )

*Ans.* 433005 mills.

( 10 )

*Ans.* £87 × 20 + 9s. = 749s. ; 749s. × 12 + 8d. = 8996d.

( 11 )

1569far. ÷ 4 = 392d. + 1far. ; 392d ÷ 12 = 32s. + 8d. ;

32s. ÷ 20 = £1 + 12s. ; £1 12s. 8d. 1far. *Ans.*

( 12 )

7T. × 20 + 14cwt. = 154cwt. ; 154cwt. × 4 + 1qr. = 617qr. ;

617qr. × 25 + 20lbs. = 15445lbs. *Ans.*

( 13 )

$$15445\text{lbs.} \div 25 = 617\text{qr.} + 20\text{lbs.}; 617\text{qr.} \div 4 = 154\text{cwt.} + 1\text{qr.};$$

$$154\text{cwt.} \div 20 = 7\text{ T.} + 14\text{cwt.}; 7\text{ T.} 14\text{cwt.} 1\text{qr.} 20\text{lbs.} \text{ Ans.}$$

( 14 )

$$4\text{lb.} \times 12 + 6\text{oz.} = 54\text{oz.}; 54\text{oz.} \times 20 + 12\text{dwt.} = 1092\text{dwt.};$$

$$1092\text{dwt.} \times 24 + 7\text{grs.} = 26215 \text{ grains.} \text{ Ans.}$$

( 15 )

$$704121\text{gr.} \div 24 = 29338\text{dwt.} + 9\text{gr.}; 29338\text{dwt.} \div 20$$

$$= 1466\text{oz.} + 18\text{dwt.}; 1466\text{oz.} \div 12 = 122\text{lb.} + 2\text{oz.}$$

$$\text{Ans. } 122\text{lb. } 2\text{oz. } 18\text{pwt. } 9\text{gr.}$$

( 16 )

$$5\text{£.} \times 12 + 1\text{ s} = 61\text{ s}; 61\text{ s} \times 8 + 1\text{ d} = 489\text{ d}; 489\text{ d} \times 3 +$$

$$1\text{ d} = 1468\text{ d}; 1468\text{ d} \times 20 + 2\text{gr.} = 29362\text{gr.} \text{ Ans.}$$

( 17 )

$$174947\text{gr.} \div 20 = 8747\text{ d} + 7\text{gr.}; 8747\text{ d} \div 3 = 2915\text{ s} + 2\text{ d};$$

$$2915\text{ s} \div 8 = 364\text{ s} + 3\text{ s}; 364\text{ s} \div 12 = 30\text{£} + 4\text{ s}.$$

$$\text{Ans. } 30\text{£} 4\text{ s} 3\text{ s} 2\text{ d} 7\text{gr.}$$

( 18 )

$$6\text{yd.} \times 3 + 2\text{ft.} = 20\text{ft.}; 20\text{ft.} \times 12 + 9\text{in.} = 249\text{in.} \text{ Ans.}$$

( 19 )

$$5\text{mi} \times 320 = 1600\text{ rods.}; 1600\text{rd.} \times 5\frac{1}{2} = 8800\text{ yards}; 8800\text{yd.} \times 3$$

$$= 26400\text{ft.}; 26400\text{ft.} \times 12 = 316800 \text{ inches.} \text{ Ans.}$$

( 20 )

$$2730\text{in.} \div 12 = 227\text{ft.} + 6\text{in.}; 227\text{ft.} \div 3 = 75\text{yd.} + 2\text{ft.}$$

$$\text{Ans. } 75\text{yd. } 2\text{ft. } 6\text{in.}$$

( 21 )

$$56\text{ sq. ft.} \div 9 = 6\text{ sq. yd. } 2\text{ sq. ft.} \text{ Ans.}$$

( 22 )

$$355P. \div 40 = 8R. + 35P. ; 8R. \div 4 = 2A.$$

*Ans.* 2A. 0R. 35P.

( 23 )

$$456 \text{ sq. ch.} \div 10 = 45A. 6 \text{ sq. ch.} \quad \textit{Ans.}$$

( 24 )

$$3A. \times 4 + 2R. = 14R. ; 14R. \times 40 + 8P. = 568P. \quad \textit{Ans.}$$

( 25 )

$$14T. \times 40 = 560 \text{ cu. ft.} ; 560 \text{ cu. ft.} \times 1728 = 967680 \text{ cu. in.} \quad A.$$

( 26 )

$$31C. \times 128 = 3968 \text{ cu. ft.} \quad \textit{Ans.}$$

( 27 )

$$56320 \text{ cu. ft.} \div 128 = 440 \text{ cords.} \quad \textit{Ans.}$$

( 28 )

$$157yd. \times 4 = 628qr. ; 628qr. \times 4 = 2512na. \quad \textit{Ans.}$$

( 29 )

$$192 E. F. \times 3 = 576qr. ; 576qr. \div 4 = 144yds. \quad \textit{Ans.}$$

( 30 )

$$97yd. \times 4 + 3qr. = 391qr. ; 391qr. \div 5 = 78 E. E. 1qr. \quad \textit{Ans.}$$

( 31 )

$$4hhd. \times 63 = 252gal. ; 252gal. \times 4 = 1008qt. \quad \textit{Ans.}$$

( 32 )

$$7560pt. \div 2 = 3780qt. ; 3780qt. \div 4 = 945gal. ;$$

$$945gal. \div 63 = 15hhd. \quad \textit{Ans.}$$

( 33 )

$$7\text{hd.} \times 54 = 378\text{gal.}; 378\text{gal.} \times 4 = 1512\text{qt.};$$

$$1512\text{qt.} \times 2 = 3024\text{pt. Ans.}$$

( 34 )

$$74304 \div 2 = 37152\text{pt.}; 37152\text{pt.} \div 2 = 18576\text{qt.}; 18576\text{qt.} \div 4$$

$$= 4644\text{gal.}; 4644\text{gal.} \div 36 = 129\text{barrels. Ans.}$$

( 35 )

$$31\text{bu.} \times 4 = 124\text{pk.}; 124\text{pk.} \times 8 = 992\text{qt.}; 992\text{qt.} \times 2 = 1984\text{pt.}$$

( 36 )

$$2110\text{pt.} \div 2 = 1055\text{qt.}; 1055\text{qt.} \div 8 = 131\text{pk.} + 7\text{qt.}; 131\text{pk.} \div 4$$

$$= 32\text{bu.} + 3\text{pk.}$$

*Ans. 32bu. 3pk. 7qt.*

( 37 )

$$365\text{da.} \times 24 + 5\text{hr.} = 8765\text{hr.}; 8765\text{hr.} \times 60 + 48\text{m.} = 525948\text{m.}$$

$$525948\text{m.} \times 60 + 48\text{sec.} = 31556928\text{sec.}; 31556928\text{sec.} \times 2$$

$$= 63113856\text{sec. Ans.}$$

( 38 )

$$254\text{da.} \div 30 = 8\text{mo. } 2\text{wk.}$$

## ADDITION.

( 1 )

$$\text{Ans. } 182630$$

( 2 )

$$\text{Ans. } 87539$$

( 3 )

$$\text{Ans. } 110526$$

( 4 )

$$\text{Ans. } 79165$$

( 5 )

$$\text{Ans. } 73285$$

( 6 )

$$\text{Ans. } 4148907$$

( 7 )

$$\text{Ans. } 395873$$

( 8 )

$$\text{Ans. } 30534\text{da.}$$

( 9 )

$$\text{Ans. } 74716\text{bu.}$$

( 10 )

$$\text{Ans. } 29909\text{rds.}$$

( 11 )

$$\text{Ans. } 74022\text{min.}$$

( 12 )

$$\text{Ans. } 833516\text{galls.}$$

( 13 ) ( 14 ) ( 15 )  
*Ans.* 32921 miles. *Ans.* 185876fur. *Ans.* 93684lbs.

( 16 ) ( 17 )  
*Ans.* 34289 dollars. *Ans.* 243972 casks.

( 18 ) ( 19 ) ( 20 )  
*Ans.* \$991,546 *Ans.* \$85,465 *Ans.* \$770,56

( 21 ) ( 22 ) ( 23 )  
*Ans.* \$525,892 *Ans.* \$9638,495 *A.* £223 2s. 5d. 1far.

( 24 ) ( 25 )  
*Ans.* 1296lb. 10oz. 2pwt. *Ans.* 453 lb 9 3/4 3 3

( 26 ) ( 27 )  
*Ans.* 2cwt. 3qr. 8lb. 8oz. 5dr. *Ans.* 43 T. 2cwt. 0qr. 7lb.

( 28 ) ( 29 )  
*Ans.* 312yd. 0qr. 2na. *Ans.* 251 E. E. 1qr. 3na.

( 30 ) ( 31 )  
*Ans.* 143 L. 2mi. 6fur. *Ans.* 4fur. 4rd. 0yd. 1ft. 7in.

( 32 ) ( 33 )  
*Ans.* 322 A. 1 R. 4 P. *Ans.* 2224 T. 0 hhd. 5 gal.

( 34 ) ( 35 )  
*Ans.* 339 gal. 3qt. 0pt. *Ans.* 230 chal. 25 bu 3pk. 4qt.

( 36 ) ( 37 )  
*Ans.* 823yr. 10mo. *Ans.* 904da. 18hr. 1m.

( 38 ) ( 39 )  
*Ans.* 2 T. 14cwt. 1qr. 20lb. 15oz. *Ans.* 23592550

( 40 )                      ( 41 )                      ( 42 )  
*Ans.* 137915940    *Ans.* 88056    *Ans.* 12 1/2 mi. 4 fur. 8 rd. 5 ft.

( 43 )                      ( 44 )  
*Ans.* 519190                      *Ans.* 1124749

( 45 )                      ( 46 )                      ( 47 )  
*Ans.* \$22,009    *Ans.* \$27,74    *Ans.* 2 T. 2 hhd. 29 gal. 2 qt.

( 48 )                      ( 49 )                      ( 50 )  
*Ans.* \$20308675    *Ans.* \$30569853    *Ans.* \$.29026

( 51 )                      ( 52 )  
*Ans.* \$8209,75                      *Ans.* 26326424

( 53 )                      ( 54 )  
*Ans.* 29714                      *Ans.* 50110025

( 55 )                      ( 56 )                      ( 57 )  
*Ans.* 59808512    *Ans.* 2 T. 4 cwt. 2 qr. 1 lb.    *Ans.* 205 acres.

( 58 )                      ( 59 )                      ( 60 )  
*Ans.* \$75002,295    *Ans.* \$7425    *Ans.* 4 lb. 5 oz. 6 pwt.

( 61 )                      ( 62 )                      ( 63 )  
*Ans.* 1053420    *Ans.* 4089507    *Ans.* 32341

( 64 )                      ( 65 )                      ( 66 )  
*Ans.* \$27131,23    *Ans.* \$28,105    *Ans.* 39 yd. 1 qr.

( 67 )                      ( 68 )                      ( 69 )  
*Ans.* \$180,825    *Ans.* \$35068,807    *Ans.* 481125

( 70 )                      ( 71 )                      ( 72 )  
*Ans.* 66585383    *Ans.* \$1019,10    *Ans.* \$33800

( 73 )

*Ans.* 380bu. 1pk.

( 74 )

*Ans.* \$458,342

( 75 )

*Ans.* £57 14s. 2d. 3far.

( 76 )

*Ans.* 5860

## SUBTRACTION.

( 1 )

*Ans.* 363296

( 2 )

*Ans.* 56579

( 3 )

*Ans.* 733071

( 4 )

*Ans.* 1711927

( 5 )

*Ans.* 41923288

( 6 )

*Ans.* 7838180

( 7 )

*Ans.* 106026

( 8 )

*Ans.* 4391

( 9 )

*Ans.* 62786

( 10 )

*Ans.* 198621115

( 11 )

*Ans.* 3591757651

( 12 )

*Ans.* 4199675

( 13 )

*Ans.* 8878778

( 14 )

*Ans.* 99999977

( 15 )

*Ans.* \$8443,641

( 16 )

*Ans.* 806,384

( 17 )

*Ans.* \$4853673,758

( 18 )

*Ans.* £14 18s. 3d. 1far.

( 19 )

*Ans.* 3ton 8cwt. 2qr. 7lb.

( 20 )

*Ans.* 117yd. 2qr. 1na.

( 21 )

*Ans.* 59L. 1mi. 3fur. 28rd.

( 22 )

*Ans.* 8T. 1hhd. 53gal. 3qt.

( 23 )

*Ans.* 89A. 2R. 37P.



( 24 )

*Ans.* 975bu. 1pk. 6qt.

( 25 )

*Ans.* 124 cords 58 ft. 522in.

( 26 )

*Ans.* 25 E. E. 1qr. 3na.

( 27 )

*Ans.* 79£ 10 3 6 3

( 28 )

*Ans.* 12 3 4 3 2 D .

( 29 )

*Ans.* 124 E. E. 3qr. 3na.

( 30 )

*Ans.* 96 E. F. 1qr. 1na.

( 31 )

*Ans.* 12T. 17cwt. 3qr.

( 32 )

*Ans.* 2cwt. 2qr. 22lb.

( 33 )

*Ans.* 69qr. 2lb. 14oz.

( 34 )

*Ans.* 134lb. 14oz. 13dr.

( 35 )

*Ans.* 10A. 2R. 18P.

( 36 )

*Ans.* 37A. 2R. 34P.

( 37 )

*Ans.* 147da. 21hr. 56min.

( 38 )

*Ans.* 52hr. 50min. 54sec.

( 39 )

*Ans.* \$8759,625

( 40 )

*Ans.* 183666662

( 41 )

*Ans.* 6yr. 9mo. 3wk. 11da.

( 42 )

*Ans.* 88£ 0 3 6 3

( 43 )

*Ans.* \$8,20

( 44 )

*Ans.* \$39,868

( 45 )

*Ans.* \$10,626

( 46 )

*Ans.* £121 17s. 0d. 1far.

( 47 )

*Ans.* 6yr. 0mo. 0wk. 6da. 9hr. 2min.

( 48 )

*Ans.* 6353870

( 49 )

*Ans.* 5747½.

( 50 )

*Ans.* \$6020

( 51 )

*Ans.* \$25712808,91

( 52 )

*Ans.* \$86190

( 53 )

*Ans.* 683021

( 54 )

*Ans.* 107445034½s.

( 55 )

*Ans.* 6274

( 56 )

*Ans.* 4 T. 3cwt. 2qr. 23lb.

( 57 )

*Ans.* £19 19s. 2d. 3far

( 58 )

*Ans.* 2299mi. 2fur. 4rd.

( 59 )

*Ans.* \$199,625

( 60 )

*Ans.* \$175,875

( 61 )

*Ans.* \$3,25

( 62 )

*Ans.* 19987563

( 63 )

*Ans.* 2899248

( 64 )

*Ans.* \$73675

( 65 )

*Ans.* 22815

( 66 )

*Ans.* \$198,625

( 67 )

*Ans.* 80yr. 8mo. 0da. 3hr. 30min.

( 68 )

*Ans.* \$655,125

( 69 )

*Ans.* 249yr. 1mo. 11da.

( 70 )

*Ans.* 17877

( 71 )

*Ans.* 7310756

( 72 )

*Ans.* \$62727794

( 73 )

*Ans.* \$7390

( 74 )

*Ans.* \$2360

( 75 )

*Ans.* 526

( 76 )

*Ans.* 6274

( 77 )	( 78 )	( 79 )
<i>gained</i> \$356,35	<i>A. 3 A. 2 R. 39 P.</i>	<i>A. 41 cords 5 cord ft.</i>

( 80 )	( 81 )	( 82 )
<i>Ans.</i> \$3280,105	<i>Ans.</i> \$44161,987	<i>Ans.</i> \$14352,50

( 83 )	( 84 )	( 85 )
<i>Ans.</i> 2yr. 8mo. 19da.	<i>Ans.</i> 30gal. 2qt. 1pt.	50062 <i>Ans.</i>

( 86 )	( 87 )
<i>Ans.</i> 15550	<i>Ans.</i> 12° 23' 53"

( 88 )	( 89 )
<i>Ans.</i> \$161,175	<i>Ans.</i> 2271707

( 90 )	( 91 )
<i>Ans.</i> 32yd. 0qr. 2na.	<i>Ans.</i> £950 2s. 8d.

## MULTIPLICATION.

( 1 )	( 2 )	( 3 )
<i>Ans.</i> 6776368	<i>Ans.</i> 68653214	<i>Ans.</i> 3422454

( 4 )	( 5 )	( 6 )
<i>Ans.</i> 1952883	<i>Ans.</i> 4354224	<i>Ans.</i> 1028540646

( 7 )	( 8 )	( 9 )
<i>Ans.</i> 24668698404	<i>Ans.</i> \$70,84	<i>Ans.</i> \$12517,764

( 10 )	( 11 )	( 12 )
<i>Ans.</i> \$961662,96	<i>Ans.</i> 201638228149	<i>Ans.</i> 4281770760

( 13 )	( 14 )	( 15 )
<i>Ans.</i> 174809600	<i>Ans.</i> 301144560000	<i>Ans.</i> 610071000

( 16 )

*Ans.* 14783518400

( 17 )

*Ans.* £81 6s. 8d.

( 18 )

*Ans.* 24 *T.* 7 *cwt.* 3 *qr.*

( 19 )

*Ans.* 118 *yd.* 1 *ft.* 3 *in.*

( 20 )

*Ans.* 114° 26' 15''

( 21 )

*Ans.* 56 *hhd.* 7 *gal.* 2 *qt.*

( 22 )

*Ans.* 598 *E.* *F.*

( 23 )

*Ans.* 865 *T.* 11 *cwt.* 3 *qr.* 20 *lb.*

( 24 )

*Ans.* 320 *yr.* 2 *mo.* 0 *wk.* 1 *da.* 15 *hr.* 12 *m.*

( 25 ) \*

*Ans.* 4896

( 26 )

*Ans.* 234048

( 27 )

*Ans.* 4482566

( 28 )

*Ans.* 314986464

( 29 )

*Ans.* 320021195962

( 30 )

*Ans.* 556321146764

( 31 )

*Ans.* 1747125213301

( 32 )

*Ans.* 2324684880333

( 33 )

*Ans.* 71109696492112

( 34 )

*Ans.* 90012355857332

( 35 )

*Ans.* 549600

( 36 )

*Ans.* 670460 ; 6704600

( 37 )

*Ans.* 5704900 ; 57049000

( 38 )

*Ans.* 4980496000 ; 49804960000

( 39 )

*Ans.* 9072040000 ; 907204000000

( 40 )

*Ans.* 74040900 ; 740409000

( 41 )

*Ans.* 67493600 ; 67493600000

( 42 )

*Ans.* 129359360000

( 43 )

*Ans.* 13729103000000

( 44 )

*Ans.* 664763206000000

( 45 )

*Ans.* 8799238229600000

( 46 )

*Ans.* 2526426017908695000000

( 47 )

*Ans.* 1093689368445084378777040

( 48 )

*Ans.* 16714410677359581583737

( 49 )

*Ans.*  $2479 \times 25 = \$61975$ 

( 50 )

*Ans.*  $15 \times 24 \times 9 = 3240$  miles.

( 51 )

 $125 \times 26 = \$3250$  ;  $96 \times 32 = \$3072$  ;  $3250 + 3072 = \$6322$  ;  
 $2500 + 1725 = \$4225$  ;  $6322 - 4225 = \$2097$ . *Ans.*

( 52 )

$$\begin{array}{r} 14\text{yd. } 3\text{qr. } 2\text{na.} \\ 9 \\ \hline \end{array}$$
*133yd. 3qr. 2na. Ans.*

( 53 )

$$\begin{array}{r} 5\text{s. } 3\text{d. } 2\text{far.} \\ 15 \\ \hline \end{array}$$
*£3 19s. 4d. 2far.*

( 54 )

*\$2,48 \times 416 = \$1031,68 Ans.*

( 55 )

$$\$8,75 \times 40 = \$350 ; \$9,125 \times 40 = \$365 ; 365 - 350 = \$15 \text{ A.}$$

( 56 )

$$7\text{cwt. } 2\text{qr. } 18\text{lb.} = 768\text{lbs.} ; 768 \times 11 = 8448\text{lbs.} ; \\ 8448 \times .06 = \$506,88 \text{ Ans.}$$

( 57 )

$$44 \times 36 \times 4 = \$6336 \text{ Ans.}$$

( 58 )

$$600 + 570 + 1200 = \$2370 ; 3479 - 2370 = \$1109 ; \\ 1109 \times 5 = \$5545 \text{ Ans.}$$

( 59 )

$$931324 \times 18 = \$16763832 \text{ Ans.}$$

( 60 )

$$\begin{array}{r} 20\text{mi. } 5\text{fur. } 16\text{rd.} \\ \quad \quad \quad 3 \\ \hline 62 \quad 0 \quad 8 \\ \quad \quad \quad 8 \\ \hline 496\text{mi. } 1\text{fur. } 24\text{rd.} \text{ Ans.} \end{array}$$

( 61 )

$$\begin{array}{r} 4\text{hr. } 45\text{min. } 30\text{sec.} \\ \quad \quad \quad 14 \\ \hline 10 \overline{) 66\text{hr. } 37\text{min. } 0\text{sec.}} \\ \quad \quad 6\text{da. } 6\text{hr. } 37\text{min.} \text{ Ans.} \end{array}$$

( 62 )

$$365 \times 30 \times .06 = \$657 \text{ Ans.}$$

( 63 )

$$\begin{array}{r} 118 \times .62\frac{1}{2} = \$73,75 \\ 9,875 \times 5 = 49,375 \\ \hline \$24,375 \text{ Ans.} \end{array}$$

( 64 )

$$(34+28) \times 14 = 868 \text{ miles. Ans.}$$

( 65 )

$$\begin{array}{r} 10 \text{ } 3 \text{ } 6 \text{ } 3 \text{ } 2 \text{ } 9 \text{ } 14\text{grs.} \\ \quad \quad \quad 8 \\ \hline 7 \text{ } 15 \text{ } 2 \text{ } 3 \text{ } 7 \text{ } 3 \text{ } 0 \text{ } 9 \text{ } 12\text{grs.} \text{ Ans.} \end{array}$$

( 66 )

$$\begin{array}{r} 2\text{bu. } 3\text{pk. } 6\text{qt.} \\ \quad \quad \quad 7 \\ \hline 20\text{bu. } 2\text{pk. } 2\text{qt.} \\ \quad \quad \quad 20 \\ \hline 411\text{bu. } 1\text{pk. } 0\text{qt.} \text{ Ans.} \end{array}$$

$$\begin{array}{cc} (67) & (68) \\ 468 \times 313 = 146484 \text{ yds. } \textit{Ans.} & 2018 \times 212 = 427816 \text{ bar. } \textit{A.} \end{array}$$

$$(69) \\ 7 \text{ cwt. } 2 \text{ qr. } 16 \text{ lbs.} = 766 \text{ lbs.}; 766 \times 11 = \$84,26, \textit{Ans.}$$

$$(70) \\ 984 \times 245 \times .07 = \$16875,60 \textit{ Ans.}$$

$$(71) \\ \begin{array}{r} 18 \text{ cwt.} \quad 3 \text{ qrs.} \quad 21 \text{ lbs.} \\ \quad \quad \quad 6 \\ \hline 5 \quad 13 \quad 3 \quad 1 \\ 2 \quad 15 \quad 1 \quad 5 \\ \hline 2 \text{ T. } 18 \text{ cwt.} \quad 1 \text{ qr.} \quad 21 \text{ lb. } \textit{Ans.} \end{array}$$

$$(72) \\ 136 \times 17 = 2312 \text{ bu.}; 2312 \times .42 = \$971,04 \textit{ Ans.}$$

$$(73) \\ \begin{array}{l} 1845 \times 7 = \$12915; 4752 + 6848 = \$11600; 528 + 856 = 1384; \\ 528 \times 9 = \$4752; 1845 - 1384 = 461 \text{ barrels left.} \\ 856 \times 8 = \$6848; \$12915 - \$11600 = \$1315, \text{ cost of } 461 \text{ bar.} \end{array}$$

$$(74) \\ 872 \times 25 \times .06\frac{1}{2} = \$1417 \textit{ Ans}$$

$$(75) \\ 52770231 \times \$1,25 = \$65962788,75 \textit{ Ans.}$$

$$\begin{array}{cc} (76) & (77) \\ 25 \times 30 = 750 \text{ days. } \textit{Ans.} & 2700 \times 5 = \$13500 \textit{ Ans.} \end{array}$$

$$\begin{array}{cc} (78) & (79) \\ 72 \times 9 \times .37\frac{1}{2} = \$243 \textit{ Ans.} & \$37,565 \times 127 = \$4770,755 \textit{ A.} \end{array}$$

( 80 )

$$127 \times 39 = \$4953 ; 4953 - 3698 = 1255 ; 1255 + 1246 = \$2501 ;$$

$$86 \times 43 = \$3698 ; 127 - 86 = 41 ; 2501 \div 41 = \$61 \text{ Ans.}$$

( 81 )

$$75 \times 56 \times .16 = \$672 \text{ Ans.}$$

( 82 )

$$46 \times 37 \times 7 = \$11914 \text{ Ans.}$$

( 83 )

$$1856 \text{ yr. } 9 \text{ mo. } 4 \text{ da.}$$

$$\begin{array}{r} 1850 \quad 4 \quad 20 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \quad 4 \quad 14 \\ \hline \end{array}$$

$$5$$

$$31 \text{ yr. } 10 \text{ mo. } 10 \text{ da.}$$

$$9$$

$$286 \text{ yr. } 9 \text{ mo. } 0 \text{ da.} \text{ Ans.}$$

( 84 )

$$10 \text{ ft. } 8 \text{ in.} \times 84 = 84 \text{ rd. } 14 \text{ ft. } A.$$

( 85 )

$$8 \times 2 + 50 = 66 ; 58 \times 2 = 116 ;$$

$$116 - 66 = 50 \text{ Ans.}$$

( 86 )

$$5 \text{ cords } 6 \text{ cord feet } 32 \text{ cu. ft.} \times 4 = 24 \text{ cords.} \text{ Ans.}$$

( 87 )

$$56 \times 25 = \$1400 ; 94 \times 32 = \$3008 ; 1400 + 3008 = \$4408 ;$$

$$(56 + 94) \times 30 = \$4500 ; 4500 - 4408 = \$92 \text{ Ans.}$$

( 88 )

$$12 \times 9 \times 2 = 216 \text{ men.} \text{ Ans.}$$

( 89 )

$$\$25,50 \times 4 = \$102$$

$$\$2,125 \times 12 = \$25,50$$

$$\$7,25 \times 3 = \$21,75$$

$$\$149,25 \text{ Ans.}$$

( 90 )

$$326 \times 116 = 37816 \text{ tons.} \text{ Ans.}$$

( 91 )

$$960 \times .09 = 86,40 ; \$4,75 \times 12 = \$57 ; \$104,90 - 70,02 = \$34,88$$

$$148 \times .12\frac{1}{2} = 18,50 ; 186 \times .07 = \$13,02$$

$$\$104,90$$

$$\$70,02$$

( 92 )

$$12 \text{ gal. } 2 \text{ qt. } 1 \text{ pt.}$$

$$14$$

$$4 \text{ bar. } 32 \text{ gal. } 3 \text{ qt.} \text{ Ans.}$$

( 93 )

$$1 \text{ gal. } 2 \text{ qt. } 1 \text{ pt. } 2 \text{ gi.} = 54 \text{ gi.} ;$$

$$54 \text{ gi.} \times 25000 = 1350000 \text{ gi.}$$

$$= 669 \text{ hhd. } 40 \text{ gal. } 2 \text{ qt. } A.$$



( 94 )

$$70000 \times 195 = \$13650000 \text{ Ans.}$$

( 95 )

$$39 \times 27 = \$1053; 70 \times 27 \times 45 = \$850,50; 1053 - 850,50 \\ = \$202,50 \text{ Ans.}$$

( 96 )

14 pounds of tea,	at 75 cents,	-	-	-	\$10,50
9 " " coffee,	14 " -	-	-	-	1,26
42 " " sugar,	11 " -	-	-	-	4,62
3 " " pepper,	12½ " -	-	-	-	,375
5 " " chocolate,	56 " -	-	-	-	2,80
12 " " candles,	16 " -	-	-	-	1,92
Amount,					\$21,475

( 97 )

48 pounds of sugar at 9½ cents a pound, - - - -	\$4,56
6 hogs. of molasses, each containing 63 gallons, at 27 cents a gallon, - - - - -	102,06
8 casks of rice, 285 lbs. each, at 5 cents a pound,	114,00
9 chests of tea, 86 lbs. each, at 87½ cents a pound,	677,25
4 bags of coffee, each 67 lbs., at 11 cents a pound,	29,48
Amount, - -	<u>\$927,35</u>

( 98 )

78 chests of tea, at \$55.65 per chest,	-	-	\$4340,70
251 bags of coffee, 100 pounds each, at	}	-	3137,50
12½ cents per pound,		-	
317 boxes of raisins, at \$2,75 per box,	-	-	871,75
1049 barrels of shad, at \$7,50 per barrel,	-	-	7867,50
76 barrels of oil, 32 gallons each, at \$1,08 per gal.,	-	-	2626,56
Amount,	-	-	<u>\$18844,01</u>

( 99 )

10 yards of broadcloth, at \$4.37½,	-	-	-	\$43,75
75 " " sheeting, " .09	-	-	-	6,75
42 " " plaid prints, at .45	-	-	-	18,90
5 barrels of Genesee flour, at \$7.87½,	-	-	-	39,375
7 pairs of boots, at \$1.60 per pair,	-	-	-	11,20
18 bushels of corn, at 72 cents per bushel,	-	-	-	12,96
Amount.	-	-	-	\$132,935

66-71-72.]

DIVISION.

25

( 100 )

			£	s.	d.
45 yards of broadcloth at 9s. 6d.	-	-	21	7	6
56 " " " 12s. 9 $\frac{1}{4}$ d.	-	-	35	15	2
16 " vestings, " 6s. 8 $\frac{1}{2}$ d.	-	-	5	7	4
24 lbs. colored thread, " 5s. 4d.	-	-	6	8	0
72 pairs silk hose, " 7s. 5 $\frac{3}{4}$ d.	-	-	26	18	6
108 yards carpeting, " 14s. 10d.	-	-	80	2	0
Amount,	-		£175	18	6

DIVISION.

( 1 )

Ans. 6579

( 2 )

Ans. 36842

( 3 )

Ans. 269368

( 4 )

Ans. 275155

( 5 )

Ans. 7948312

( 6 )

Ans. 1147187

( 7 )

Ans. 72331642

( 8 )

Ans. £15 19s. 9d.

( 9 )

Ans. 4A. 0R. 33P.

( 10 )

Ans. 9yd. 2qr. 1na.

( 11 )

Ans. \$79,3445

( 12 )

Ans. \$209,728

( 13 )

Ans. \$66862,18

( 14 )

Ans. 15311409 $\frac{12}{8}$ 

( 15 )

Ans. 237132

( 16 )

Ans. 177242

( 17 )

Ans. 68

( 18 )

Ans. 44670

( 19 )

Ans. 27 $\frac{12}{8}$ 

( 20 )

Ans. \$17,451 $\frac{1}{2}$ 

( 21 )

Ans. \$3,842 $\frac{86}{179}$ 

( 22 )

Ans. \$1,125

( 23 )

Ans. \$0,375

( 24 )

Ans. \$0,81

$$\begin{array}{r} (25) \\ \text{Ans. } \$5,01 \end{array}$$

$$\begin{array}{r} (26) \\ \text{Ans. } \$52,88 \end{array}$$

$$\begin{array}{r} (27) \\ \text{Ans. } 9 \end{array}$$

$$\begin{array}{r} (28) \\ \text{Ans. } 95 \end{array}$$

$$\begin{array}{r} (29) \\ \text{Ans. } \$8 \end{array}$$

$$\begin{array}{r} (30) \\ \text{Ans. } 763521 \end{array}$$

$$\begin{array}{r} (31) \\ \text{Ans. } 4072941\frac{989}{784} \end{array}$$

$$\begin{array}{r} (32) \\ \text{Ans. } 131951331\frac{242}{574} \end{array}$$

$$\begin{array}{r} (33) \\ \text{Ans. } 125139201\frac{13019}{45708} \end{array}$$

$$\begin{array}{r} (34) \\ \text{Ans. } 269577255882\frac{5581}{17493} \end{array}$$

$$\begin{array}{r} (35) \\ \text{Ans. } 14243757748\frac{35411}{47143} \end{array}$$

$$\begin{array}{r} (36) \\ \text{Ans. } 153959191\frac{2214}{37149} \end{array}$$

$$\begin{array}{r} (37) \\ \text{Ans. } 30001000\frac{6347}{57143} \end{array}$$

$$\begin{array}{r} (38) \\ \text{Ans. } 1318096551\frac{104999}{374867} \end{array}$$

$$\begin{array}{r} (39) \\ \text{Ans. } 3003355752\frac{73118}{371067} \end{array}$$

$$\begin{array}{r} (40) \\ \text{Ans. } 9948157977\frac{81605}{878957} \end{array}$$

$$\begin{array}{r} (41) \\ \text{Ans. } 59085714\frac{84}{131} \end{array}$$

$$\begin{array}{r} (42) \\ 12581271\frac{5785}{57149} \end{array}$$

$$\begin{array}{r} (43) \\ \text{Ans. } 119191753\frac{99107}{123456} \end{array}$$

$$\begin{array}{r} (44) \\ 41)729A. 2R. 7P. \\ \hline 17A. 3R. 7P. \end{array}$$

$$\begin{array}{r} (45) \\ 240)365da. 6hr. \\ \hline \text{Ans. } 1da. 12hr. 31min. 30sec. \end{array}$$

$$\begin{array}{r} (46) \\ 37)1298mi. 2fur. 33rd. \\ \hline 35mi. 0fur. 29rd. \text{ Ans.} \end{array}$$

$$\begin{array}{r} (47) \\ 120)95hhd. 6gal. \\ \hline \text{Ans. } 0hhd. 49gal. 3\frac{84}{120}qt. \end{array}$$

$$\begin{array}{r} (48) \\ 105)232bu. 3pk. 7qt. \\ \hline 2bu. 0pk. 7qt. \text{ Ans.} \end{array}$$

$$\begin{array}{r} (49) \\ 725 \overline{)18306,25} \\ \underline{\phantom{00}25,25} \text{ Ans.} \end{array}$$

$$\begin{array}{r} (50) \\ 7 \overline{)16s. 4d.} \\ \underline{\phantom{00}2s. 4d.} \text{ Ans.} \end{array}$$

$$\begin{array}{r} (51) \\ 12 \overline{)265mi. 6fur. 16rd.} \\ \underline{\phantom{00}22mi. 1fur. 8rd.} \text{ Ans.} \end{array}$$

$$\begin{array}{r} (52) \\ 9 \overline{)589A. 2R. 23P.} \\ \underline{\phantom{00}63 \quad 1 \quad 7} \\ \phantom{000}5 \\ \underline{\phantom{000}316A. 1R. 35P.} \text{ Ans.} \end{array}$$

$$\begin{array}{r} (53) \\ \text{Ans. } \$27,397 + \end{array}$$

$$\begin{array}{r} (54) \\ \text{Ans. } 98765 \end{array}$$

$$(55) \\ \$75000 \div 4 = 18750; 75000 - 18750 \div 5 = \$11250 \text{ Ans.}$$

$$(56) \\ 54026818 \div 365 = 148018 \frac{241}{365} \text{ Ans.}$$

$$(57) \\ \$133 \div 28 = \$4,75 \text{ Ans.}$$

$$(58) \\ \$637,50 \div 51 = \$12,50 \text{ Ans.}$$

$$(59) \\ A. 78747600 \div 104 = 757188 \frac{48}{104}$$

$$(60) \\ \$30,875 \div 19 = \$1,625 A.$$

$$(61) \\ 5 \times 5 = 25; 9125 \div 25 = 365da. \text{ Ans.}$$

$$(62) \\ 800008 \text{ Ans.}$$

$$(63) \\ 10oz. 11pwt. 12gr. = 5076grs.; 4pwt. 12gr. = 108grs.; \\ 5076 \div 108 = 47 \text{ rings. Ans.}$$

$$(64) \\ \$67,50 \div 2 = 3375lb. = 1T. 13cwt. 3qr. \text{ Ans.}$$

$$(65) \\ 12T. 38ft. 106in. \div 14 = 45c. ft. 995 \frac{5}{7}cu. in. \text{ Ans.}$$

( 66 )

$$285702 \div 9285 = 30\frac{11\frac{1}{2}}{3\frac{1}{2}} \text{ tons. } \textit{Ans.}$$

( 67 )

$$942321 \div 213 = 4424\frac{9}{13} \text{ vols. } \textit{Ans.}$$

## CONTRACTIONS.

( 2 )

$$28700 \div 4 = 7175 \text{ } \textit{Ans.}$$

( 3 )

$$18400 \div 4 = 4600 \text{ } \textit{Ans.}$$

( 4 )

$$674100 \div 4 = 168525 \text{ } \textit{Ans.}$$

( 5 )

$$307400 \div 4 = 76850 \text{ } \textit{Ans.}$$

( 2 )

$$327 \times 8\frac{1}{2} = 2725 \text{ } \textit{Ans.}$$

( 3 )

$$23744 \times 16\frac{1}{2} = 387321 \text{ } \textit{Ans.}$$

( 4 )

$$34700 \times 127\frac{1}{2} = 4413840 \text{ } \textit{Ans.}$$

( 5 )

$$1272 \times 12\frac{1}{2} = 15423 \text{ } \textit{Ans.}$$

( 6 )

$$9824 \times 272\frac{1}{4} = 2674584 \text{ } \textit{Ans.}$$

( 7 )

$$3828 \times 73\frac{1}{2} = 280082 \text{ } \textit{Ans.}$$

( 1 )

$$38400 \div 8 = 4800 \text{ } \textit{Ans.}$$

( 2 )

$$47600 \div 8 = 5950 \text{ } \textit{Ans.}$$

( 3 )

$$1480000 \div 8 = 185000 \text{ } \textit{Ans.}$$

( 4 )

$$67041800 \div 8 = 8380225 \text{ } \textit{Ans.}$$

( 1 )

$$167925200 \div 3 = 55975066\frac{2}{3}.$$

( 2 )

$$148072400 \div 3 = 49357466\frac{2}{3}.$$

( 3 )

$$1067551200 \div 3 = 355850400.$$

( 4 )

$$444217200 \div 3 = 148072400.$$

(1)

$$59264000 \div 8 = 7408000 \text{ Ans.}$$

(2)

$$17593408000 \div 8 = 2199176000 \text{ Ans.}$$

(3)

$$1940812000 \div 8 = 242601500 \text{ Ans.}$$

(4)

$$140588000 \div 8 = 17573500 \text{ Ans.}$$

(1)

$$6350 \times 4 \div 100 = 254 \text{ Ans.}$$

(2)

$$21345 \times 4 \div 100 = 853 \frac{80}{100}$$

(3)

$$656280 \times 4 \div 100 = 26251 \frac{20}{100} \text{ Ans.}$$

(4)

$$7278675 \times 4 \div 100 = 291147 \text{ Ans.}$$

(5)

$$5287215 \times 4 \div 100 = 211488 \frac{60}{100} \text{ Ans.}$$

(6)

$$12225 \times 8 \div 100 = 978 \text{ Ans.}$$

(7)

$$10650 \times 8 \div 100 = 852 \text{ Ans.}$$

(8)

$$11925 \times 8 \div 100 = 954 \text{ Ans.}$$

(9)

$$1760600 \times 8 \div 100 = 140848$$

(10)

$$\text{Ans. } 67500 \times 3 \div 100 = 2025$$

(11)

$$1308400 \times 3 \div 100 = 39252$$

(12)

$$15851400 \times 3 \div 100 = 475542 \text{ Ans.}$$

( 13 )

$$8072400 \times 8 \div 100 = 242172 \text{ Ans.}$$

( 14 )

$$281250 \times 8 \div 1000 = 2250 \text{ Ans}$$

( 15 )

$$6015750 \times 8 \div 1000 = 48126 \text{ Ans.}$$

( 16 )

$$2026875 \times 8 \div 1000 = 16215 \text{ Ans.}$$

( 1 )

$$(2322 \div 2) \div 3 = 387 \text{ Ans.}$$

( 2 )

$$(37152 \div 4) \div 6 = 1548 \text{ Ans.}$$

( 3 )

$$(19152 \div 6) \div 6 = 532 \text{ Ans.}$$

( 4 )

$$(38592 \div 4) \div 12 = 804 \text{ Ans.}$$

( 5 )

$$(1145592 \div 8) \div 9 = 15911 \text{ A.}$$

( 6 )

$$(185760 \div 8) \div 12 = 1935 \text{ A.}$$

( 7 )

$$(115776 \div 8) \div 8 = 1809 \text{ A.}$$

( 8 )

$$(463104 \div 12) \div 12 = 3216 \text{ A.}$$

( 1 )

$$\begin{array}{r} 7)416705 \\ 9)59529 \dots 2 \\ 5)8614 \dots 3 \\ 1322 \dots 4 \end{array}$$

( 2 )

$$\begin{array}{r} 3)804106 \\ 2)268035 \dots 1 \\ 7)134017 \dots 1 \\ 11)19145 \dots 2 \\ 1740 \dots 5 \end{array}$$

$$4 \times 9 + 3 = 39 ;$$

$$5 \times 7 + 2 = 37 ; 37 \times 2 + 1 = 75 ;$$

$$39 \times 7 + 2 = 275.$$

$$75 \times 3 + 1 = 226.$$

$$\text{Ans. } 1322\frac{1}{2}.$$

$$\text{Ans. } 1740\frac{3}{4}.$$

( 3 )

$$756807 \div 4 \times 8 \times 9 \times 12 = 218\frac{3}{4} \text{ Ans.}$$

(4)

$$8741659 \div 3 \times 5 \times 7 = 83253\frac{24}{105} \text{ Ans.}$$

(5)

$$947043 \div 5 \times 7 \times 11 = 2459\frac{323}{385} \text{ Ans.}$$

(6)

$$4704967 \div 11 \times 7 \times 5 \times 3 = 4073\frac{652}{1155} \text{ Ans.}$$

(7)

$$71874607 \div 8 \times 7 \times 9 \times 5 \times 3 = 9507\frac{1987}{560} \text{ Ans.}$$

(1)

$$1972654 \div 420000 = 4\frac{22444}{105000} \text{ Ans.}$$

(2)

$$1752000 \div 12000 = 146 \text{ Ans.}$$

(3)

$$73199006 \div 801400 = 91\frac{271666}{801400} \text{ Ans.}$$

(4)

$$11428729800 \div 72000 = 158732\frac{45800}{72000} \text{ Ans.}$$

(5)

$$36981400 \div 146000 = 253\frac{42400}{146000} \text{ Ans.}$$

(6)

$$141614398 \div 63000 = 2247\frac{53398}{63000} \text{ Ans.}$$

(1)

$$3245 \div 16\frac{1}{2} = 196\frac{22}{33} \text{ Ans.}$$

(2)

$$47804 \div 15\frac{1}{2} = 3117\frac{39}{16} \text{ Ans.}$$

(3)

$$870631 \div 14\frac{1}{4} = 61096\frac{53}{4} \text{ Ans.}$$

(4)

$$37214 \div 51\frac{1}{2} = 727\frac{382}{103} \text{ A.}$$



$$(5) \quad 87317 \div 9\frac{1}{2} = 9095\frac{14}{11} \text{ Ans.}$$

$$(6) \quad 87906 \div 12\frac{1}{2} = 6992\frac{48}{11} \text{ Ans.}$$

$$(7) \quad 95675 \div 15\frac{5}{9} = 6150\frac{75}{140} \text{ Ans.}$$

$$(8) \quad 71096 \div 17\frac{1}{2} = 4079\frac{24}{125} \text{ Ans.}$$

## APPLICATIONS.

$$(1) \quad 284 \div 2 = \$142 \text{ Ans.}$$

$$(2) \quad 51 \div 3 = \$17 \text{ Ans.}$$

$$(3) \quad 112 \div 8 = \$14 \text{ Ans.}$$

$$(4) \quad 175 \div 5 = \$35 \text{ Ans.}$$

$$(6) \quad 129 \times 1\frac{1}{2} = \$172 \text{ Ans.}$$

$$(7) \quad 96 \times 1\frac{1}{2} = \$120 \text{ Ans.}$$

$$(8) \quad 25 \times 3 \times 1\frac{1}{2} = \$90 \text{ Ans.}$$

$$(1) \quad 3742 \times 3,25 \div 100 = \$121,615 \text{ Ans.}$$

$$(2) \quad 5400 \times 12,50 \div 1000 = \$67,50 \text{ Ans.}$$

$$(3) \quad \$118,9145 \text{ Ans.}$$

$$(1) \quad 1575 \times 1,92 \div 1000 = \$3,024 \text{ Ans.}$$

$$(2) \quad (3496 \times 7,37\frac{1}{2} \div 2) \div 1000 = \$12,8915 \text{ Ans.}$$

(3)

$$1260 \times 4,70 \div 1000 = \$5,922; 1260 \times 5,12\frac{1}{2} \div 1000 = \$6,457\frac{1}{2};$$

$$1260 \times 7,30 \div 1000 = \$9,198 \quad \text{Ans.}$$

(4)

$$5482 \times 3,32\frac{1}{2} \div 1000 = \$18,227\frac{1}{2} \quad \text{Ans.}$$

(1)

$$78^\circ 55' - 73^\circ 42' = 5^\circ 13' \text{ Diff. of Longitude.}$$

$$5^\circ 13' \times 4 = 20\text{min. } 52\text{sec. Diff. in Time.}$$

(2)

$$89^\circ 33' - 74^\circ 1' = 15^\circ 32' \text{ Diff. of Long. ; } 15^\circ 32' \times 4$$

$$= 1\text{hr. } 2\text{min. } 8\text{sec. Later. Ans.}$$

(3)

$$12\text{hr.} - 11\text{hr. } 6\text{min. } 28\text{sec.} = 53\text{min. } 32\text{sec. ; } 53\text{min. } 32\text{sec.} \div 4$$

$$= 13^\circ 23' \text{ Diff. of Long. Ans.}$$

(4)

$$75^\circ 10' - 74^\circ 1' = 1^\circ 9' \text{ Diff. of Long. ; } 1^\circ 9' \times 4$$

$$= 4\text{min. } 36\text{sec. Diff. in Time. Ans.}$$

(5)

$$89^\circ 2' - 77^\circ 2' = 12^\circ; 12^\circ \times 4 = 48\text{min. Diff. in Time.}$$

$$9\text{hr.} - 48\text{min.} = 8\text{hr. } 12\text{min. Ans.}$$

(6)

$$42\text{min. } 16\text{sec.} \div 4 = 10^\circ 34' \text{ Diff. of Long. Ans.}$$

(7)

$$2\text{hr.} \times 15 = 30^\circ; 20\text{min. } 44\text{sec.} \div 4 = 5^\circ 11'; 30^\circ + 5^\circ 11'$$

$$= 35^\circ 11' \text{ Diff. of Long. Ans.}$$

( 8 )

$$\begin{aligned}
 22min. 12sec. \div 4 &= 5^{\circ} 33' \text{ Diff. of Long. ; } 90^{\circ} 15' + 5^{\circ} 33' \\
 &= 95^{\circ} 48' ; 10hr. 40min. - 22min. 12sec. \\
 &= 10hr. 17min. 48sec. \text{ Ans.}
 \end{aligned}$$

( 9 )

$$8 \times 15^{\circ} = 120^{\circ} \text{ Diff. of Long. Ans.}$$

( 10 )

$$15^{\circ} 35' \times 4 = 1hr. 2min. 20sec. \text{ Fast. Ans.}$$

( 1 )

$$96 \times 1\frac{1}{2} = \$128 \text{ Ans.}$$

( 2 )

$$1066bu. 2pk. \div 474 = 2bu. 1pk. \text{ Ans.}$$

( 3 )

$$\$4,32 \times 12\frac{1}{2} = \$53,28 \text{ Ans.}$$

( 4 )

$$\$36 \div .45 = 80bu. ; 80bu. \div 2\frac{1}{2} = 32bar. \text{ Ans.}$$

( 5 )

$$1236 \times 375 + 184 = 463684 \text{ Ans.}$$

( 6 )

$$60000000 \div 24 \div 60 = 41666\frac{2}{3} \text{ gallons. Ans.}$$

( 7 )

$$23191876 \div 400 = 57979\frac{176}{100} \text{ Ans.}$$

( 8 )

$$25000 \div 45 = 555\frac{2}{3} \text{ Ans.}$$

( 9 )

$$2mo. 3wk. 6da. \times 25 \div 10 = 7mo. 1wk. 4\frac{1}{2}da. \text{ Ans.}$$

( 10 )

$$1200 - 640 = 560; 6720 \div 560 = 12 \text{ years. } \textit{Ans.}$$

( 11 )

$$20000000 \div 80 = 250000m. = 6mo. 0wk. 5da. 14hr. 40m.$$

( 12 )

$$47400 \div 3160 = \$15; 11475 \div 15 = 765bar. \textit{Ans.}$$

( 13 )

$$96 \times 6 \times 12\frac{1}{2} = \$72. \textit{Ans.}$$

( 14 )

$$1000 \times .005 = \$5. \textit{Ans.}$$

( 15 )

$$\$9,50 \times 85\frac{1}{2} = \$812,25. \textit{Ans.}$$

( 16 )

$$1hhd. 2gal. 3qt. = 263qts.; 263 \times .56\frac{1}{4} = \$147,9375. \textit{Ans.}$$

( 17 )

$$1s. 6d. = 18d.; 196 \times 18d. = 3528d. = £14 14s. \textit{Ans.}$$

( 18 )

$$2s. 8d. = 32d.; 1246 \times 32d. = 39872d. = £166 2s. 8d. \textit{Ans.}$$

( 19 )

$$£2 16s. = 56s. = 672d.; 672d. \div 112 = 6d. \textit{Ans.}$$

( 20 )

$$1426 \times \$4,87\frac{1}{2} = \$6,95175. \textit{Ans.}$$

( 21 )

$$3840 \times \$2,25 = \$8,64. \textit{Ans.}$$

( 22 )

$$124 \times 2\frac{1}{4} \div 3 = \$98. \textit{Ans.}$$

( 23 )

$$\$11812,50 \div 1500 = \$7,875. \textit{Ans.}$$

( 24 )

$$\$142,02 \div 789 = .18cts. \textit{A.}$$

( 25 )

$$(16200 \div 25) \div 18 = 36. \text{ Ans.}$$

( 26 )

$$10059.28 \div 92 = 10934 \text{ pwt.} = 45 \text{ lb. } 6 \text{ oz. } 14 \text{ pwt. Ans.}$$

( 27 )

$$\$4200 \div \$84 = 50 \text{ shares. Ans.}$$

( 28 )

$$640 \times 15 = \$9600; 160 \times 20 = \$3200; 240 \times 18 = \$4320;$$

$$\$3200 + \$4320 + \$4560 = \$12080; \$12080 - \$9600 = \$2480$$

$$160 + 240 = 400 \text{ acres; } 640 - 400 = 240 \text{ acres;}$$

$$4560 \div 240 = \$19. \text{ Ans.}$$

( 29 )

2 walls, each 65 feet long; and 2, each 48 feet long;

$$65 \times 2 + 48 \times 2 = 226; 226 \times 12 \times 2\frac{1}{2} = 6780 \text{ cu. ft.}$$

( 30 )

$$325640 \times \$2.37\frac{1}{2} \div 1000 = \$773,395. \text{ Ans.}$$

( 31 )

$$684 \times \$6.20 \div 1000 = \$4,2408. \text{ Ans.}$$

( 32 )

$$786 \times \$2.72\frac{1}{2} \div 100 = \$16,7025. \text{ Ans.}$$

( 33 )

$$40 \text{ ft.} = 480 \text{ in.}; 16 \text{ ft.} = 192 \text{ in.}; 480 \times 192 = 92160 \text{ sq. in.};$$

$$92160 \div 24 = 3840 \text{ shingles on one side; } 3840 \times 2 = 7680 \text{ shingles on both sides.}$$

( 34 )

$$14 \text{ lb. } 8 \text{ oz. } 12 \text{ pwt. } 3 \text{ gr.} \div 9 = 1 \text{ lb. } 7 \text{ oz. } 12 \text{ pwt. } 11 \text{ gr. Ans.}$$

( 35 )

$$\$2688 \div 320 = \$8,40 \text{ cost ; } \$8,40 + \$1,60 = \$10. \text{ Ans.}$$

( 36 )

$$449 \text{ bu. } 1 \text{ pk. } 2 \text{ qt. } \div 182 = 2 \text{ bu. } 1 \text{ pk. } 7 \text{ qt. } \text{ Ans.}$$

( 37 )

$$750 \times \$7,25 = \$5437,50 ; \$5437,50 - \$4875 = \$562,50 \text{ whole gain ; } \$562,50 \div 750 = \$0,75 \text{ gain on each barrel. } \text{Ans.}$$

( 38 )

$$169 \div 1,625 = 104 \text{ sheep. } \text{Ans.}$$

( 39 )

$$267,75 \div 6,375 = 42 \text{ days. } \text{Ans.}$$

( 40 )

$$58 \text{ lb.} = 928 \text{ oz. ; } 3 \text{ lb. } 10 \text{ oz.} = 58 \text{ oz. ; } 928 \div 58 = 16 \text{ cannisters. } \text{A.}$$

( 41 )

$$1358 \text{ gal. } 2 \text{ qt. } \div 26 = 52 \text{ gal. } 1 \text{ qt. } \text{ Ans.}$$

( 42 )

$$942312 \div 213 = 4424. \text{ Ans.}$$

( 43 )

$$3801,65 - 3475,25 = 326,40 \text{ whole gain ; } 326,40 \div 3,40 = 96 \text{ acres. } \text{Ans.}$$

( 44 )

$$43313281 + 6500000 + 8500000 = 58313281 ; \\ 58313281 - 57715000 = \$598281. \text{ Ans.}$$

( 45 )

12ft.=144in. ; 16ft. 6in.=198in. ; 264 miles=16727040in. ;  
 $16727040 \div 144 = 116160$  times ;  $16727040 \div 198 = 84480$   
 times ;  $116160 - 84480 = 31680$  times. *Ans.*

( 46 )

$9 \times 4\frac{1}{3} = 39$  sq. mi. ;  $39 \times 640 = 24960$  sq. acres ;  $24960 \div 192$   
 $= 130$  farms. *Ans.*

( 47 )

$4093850 \div 34337 = 119\frac{7747}{34337}$  *Ans.*

( 48 )

$\$305780253 - \$261382960 = \$44397293$  *Ans.*

( 49 )

$89^\circ 2' - 75^\circ 10' = 13^\circ 52'$  ;  $13^\circ 52' \times 4 = 55m. 28sec.$  Diff.  
 in Time ;  $12hr. - 55m. 28sec. = 11hr. 4m. 32sec.$  *Ans.*

( 50 )

$8hr. \times 15 = 120^\circ$  ;  $30min. \div 4 = 7^\circ 30'$  ;  $120^\circ + 7^\circ 30'$  .  
 $= 127^\circ 30'$  *Ans.*

( 51 )

$23min. \div 4 = 5^\circ 45'$  Diff. of Long. ;  $73^\circ 20' - 5^\circ 45' = 67^\circ 35'$   
 A's Long. ;  $9hr. 42m. - 23m. = 9hr. 19m.$  P.M. B's time.

( 52 )

$120$  cords  $7$  cord feet  $5$  c. ft.  $\div 11 = 10$  cords  $7$  cord feet  $15$  c. ft.

( 53 )

$16cwt. 2qr. 11lb. 10oz. \div 9 = 1cwt. 3qr. 9lb. 10oz.$  *Ans.*

( 54 )

$\$625,40 + \$110,125 = \$735,525$  ;  $\$900 - \$735,525 = \$164,475$

( 55 )

1775	4	19	
1492	10	11	
282yr. 6mo. 8da.			Ans.

( 56 )

$$\begin{aligned}
 (1\text{pt. } 3\text{gi.}) \times 18 &= 3\text{gal. } 3\text{qt. } 1\text{pt. } 2\text{gi.}; & 6\text{gal.} \times 3 &= 18\text{gal.}; \\
 (2\text{qt. } 1\text{pt. } 3\text{gi.}) \times 48 &= 34\text{gal. } 2\text{qt.}; & 3\text{gal. } 3\text{qt. } 1\text{pt. } 2\text{gi.} &+ 18\text{gal.} \\
 + 34\text{gal. } 2\text{qt.} &= 56\text{gal. } 1\text{qt. } 1\text{pt. } 2\text{gi.}; & 63\text{gal.} - 56\text{gal. } 1\text{qt. } 1\text{pt.} & \\
 & 2\text{gi.} &= 6\text{gal. } 2\text{qt. } 0\text{pt. } 2\text{gi.} & \text{Ans.}
 \end{aligned}$$

( 57 )

$$\begin{aligned}
 753689\text{yd.} \div 5\frac{1}{2} &= 137034\text{rd. } 2\text{yd.}; & 137034\text{rd.} \div 40 & \\
 = 3425\text{fur. } 34\text{rd.}; & 3425\text{fur.} \div 8 &= 428\text{mi. } 1\text{fur.}; & 428\text{mi.} \div \\
 69\frac{1}{2} &= 6\text{Deg. } 11\text{mi.}; & 6\text{Deg. } 11\text{mi. } 1\text{fur. } 34\text{rd. } 2\text{yd.} & \text{Ans.}
 \end{aligned}$$

( 58 )

$$\begin{aligned}
 189\text{mi.} \times 8 + 3\text{fur.} &= 1515\text{fur.}; & 1515\text{fur.} \times 40 + 6\text{rd.} &= 60606\text{rd.}; \\
 60606\text{rd.} \times 16\frac{1}{2} + 1\text{ft.} &= 1000000\text{ft.} & \text{Ans.}
 \end{aligned}$$

( 59 )

$$768 \div 24 = 32 \text{ rods.}; \quad 32\text{rd.} \times 48 \times 9 = 13824 \text{ rods.} \quad \text{Ans.}$$

( 60 )

$$7913576 \div 209 = 37864; \quad 37864 - 1764 = 36100 \quad \text{Ans.}$$

( 61 )

$$146\text{mi. } 7\text{fur. } 14\text{rd. } 14\text{ft.} \div 5 = 29\text{mi. } 3\text{fur. } 2\text{rd. } 16\text{ft.} \quad \text{Ans.}$$

( 62 )

$$\$17712,50 \div 325 = \$54,50; \quad 545 \div 54,50 = 10 \text{ acres.} \quad \text{Ans.}$$

( 63 )

$$4 + 5 = \$9; \quad 324 \div 9 = 36 \text{ yards.} \quad \text{Ans.}$$



( 64 )

$$68yd. 3qr. \div 4 = 17yd. 0qr. 3na. ; (17yd. 0qr. 3na.) \div 5 \\ = 3yd. 1qr. 3na. \quad Ans.$$

( 65 )

$$18d. + 12d. + 10d. = 40d. ; £5 \ 10s. = 1320d. ; 1320 \div 40 \\ = 33 \text{ of each. } \quad Ans.$$

( 66 )

$$20936468 \div 1585 = 13209 + \quad Ans.$$

( 67 )

$$72 \times 12 = 864 ; 6 \times 12 = 72 ; 864 - 72 = 792 \text{ eggs left ;} \\ 792 \times 1\frac{1}{2} = \$11.88 \quad Ans.$$

( 68 )

$$13 \text{ leap years} = 4758da. ; 37 \text{ common years} = 13505 \text{ days ;} \\ 13505 + 4758 = 18263da. \text{ Then, } 18263 \times 45 = 821835m. \\ \text{saved, equal } 1yr. 205da. 17hr. 15m. \quad Ans.$$

( 69 )

1858yr.	1mo.	10da.	15hr.	
1832	6	24	6	
<hr style="width: 100%;"/>	<hr style="width: 100%;"/>	<hr style="width: 100%;"/>	<hr style="width: 100%;"/>	
25yr.	6mo.	16da.	9hr.	Ans.

( 70 )

$$408434 \times \$10.25 = \$4186448.50 ; 2550092 \times \$2.12\frac{1}{2} = \\ \$5418945.50 ; 1048540 \times \$0.94 = \$985627.60 ; \$4186448.50 + \\ \$5418945.50 + \$985627.60 = \$10591021.60 \quad Ans.$$

( 71 )

$$85 \times 5 = \$425 ; 25 \times 22 = \$550 ; 150 \times 2 = \$300 ; 5000 + 425 + \\ 550 + 110 + 300 + 45 + 174 + 450 + 380 = \$7434 ; \$7434 \div 3 \\ = \$2478 \text{ widow's share ; } 7434 - 2478 = \$4956 ; 4956 \div 4 \\ = \$1239 \text{ each child's share. } \quad Ans.$$

( 72 )

$$241200000 \div 26800000 = \$9.$$

( 73 )

$$\begin{aligned} 55\text{ft.} &= 660\text{in.}; 16\frac{1}{2}\text{ft.} = 198\text{in.}; 660 \times 198 = 130680 \text{ sq. in.}; \\ \frac{1}{2} \text{ of } 15\text{in.} &= 5\text{in.}; 5\text{in.} \times 4\text{in.} = 20\text{sq. in. for each shingle}; \\ 130680 \div 20 &= 6534 \text{ shingles for one side}; 6534 \times 2 \\ &= 13068 \text{ shingles for both sides. } \textit{Ans.} \end{aligned}$$

( 74 )

$$\begin{aligned} 77^\circ 2' + 30^\circ 45' &= 107^\circ 47' \text{ Diff. in Long.}; 107^\circ 47' \times 4 \\ &= 7\text{hr. } 11\text{m. } 8\text{sec. Diff. in time. } \textit{Ans.} \end{aligned}$$

( 75 )

$$\begin{aligned} 6\text{hr.} + 7\text{hr. } 11\text{m. } 8\text{sec.} &= 13\text{hr. } 11\text{m. } 8\text{sec.} \\ &= 10^\circ \text{c. } 11\text{m. } 8\text{sec. } P. M. \textit{ Ans.} \end{aligned}$$

( 76 )

$$\begin{aligned} 3\text{hr. } 12\text{m.} + 1\text{hr. } 44\text{m.} &= 40^\circ \text{c. } 56\text{m. time at the place of} \\ \text{observation}; 1\text{hr.} \times 15 &= 15^\circ; 44\text{m.} \div 4 = 11^\circ; \\ 15^\circ + 11^\circ &= 26^\circ \text{ Diff. of Long. } \textit{Ans.} \end{aligned}$$

( 77 )

$$45 - 25 = 20\text{gal.}; 960 \div 20 = 48 \text{ hours. } \textit{Ans.}$$

( 78 )

$$\$3180 - \$500 = \$1680; 1680 \div 840 = \$2. \textit{ Ans.}$$

( 79 )

$$\begin{aligned} 6500500 \times .50 &= \$3250250; 3250250 \div 750 = \\ 4333\frac{1}{3} &\text{ school houses. } \textit{Ans.} \end{aligned}$$

( 80 )

$$\begin{aligned} 30 \times .37\frac{1}{2} &= \$11.25; 45 \times 6 = \$2.70; 60 \times .08\frac{1}{2} = \$3.90; \$2.70 + \\ 3.90 &= \$6.60; 11.25 - 6.60 = \$4.65; 4.65 \div .10 = 46\frac{1}{2}\text{bs. } \textit{A.} \end{aligned}$$

( 81 )

12mi. 3fur. 20rd. = 3980rd. ; 174mi. 1fur. = 55720rd. ;  
 $55720 \div 3980 = 14$  days. *Ans.*

( 82 )

2bar. 12gal. 2qt.  $\times 12 = 28$ bar. 6gal. *Ans.*

( 83 )

550pt. = 2bar. 5gal. 3qt. ; 400qt. = 3bar. 5gal. 2qt. ; 350 two  
 quarts = 5bar. 17gal. 2qt. ; 375 three quarts = 8bar. 29gal.  
 1qt. ; 150gal. = 4bar. 24gal. ; 2bar. 5gal. 3qt. + 3bar. 5gal.  
 2qt. + 5bar. 17gal. 2qt. + 8bar. 29gal. 1qt. + 4bar. 24gal.  
 $= 24$ bar 19gal. *Ans.*

( 84 )

$18 \times 16 = 288$ sq. ft. ;  $288 \times 2 = 576$ sq. ft. in both ;  $576 \div 9$   
 $= 64$ sq. yd. ;  $64 \times \$1,33\frac{1}{2} = \$85,33\frac{1}{2}$  *Ans.*

( 85 )

$22 \times 2 = 44$  ;  $16 \times 2 = 32$  ;  $44 + 32 = 76$ ft. ;  $76 \times 9 = 684$ sq. ft. ;  
 $10$ yd. = 30ft. ;  $30 \times 2 = 60$ sq. ft. ;  $684$ sq. ft.  $\div 60$ sq. ft.  
 $= 11\frac{2}{3}$  rolls. *Ans.*

( 86 )

1mi. 4fur. 20rd. = 500 rods ; If to gain 5 rods he must travel  
 25 rods, to gain 500 rods he must travel as many times 25 rods  
 as 5 rods is contained times in 500 rods, which is 100 ;  
 therefore, he must travel 100 times 25 rods = 2500 rods =  
 7mi. 6fur. 20rd. *Ans.*

( 87 )

$\$1,75 \times 500 = \$875,00$  ;  $875,00 \div ,05 = 17500$ lbs. ;  $17500 \div 2$ lb  
 $= 8750$ lbs. *Ans.*

( 88 )

$\$12,875 \times 7 = \$90,125$  cost of the whole ;  $7 - 2 = 5$  ;  
 $\$90,125 \div 5 = \$18,025$  what he received per barrel. *Ans.*

( 89 )

$\$26250 - \$18750 = \$7500$  whole gain ;  $7500 \div 3$   
 $= 2500$  barrels. *Ans.*

( 90 )

$(964bu. 2pk. 4qt.) \div 2 = 482bu. 1pk. 2qt.$  the first one's share ;  
 $(482bu. 1pk. 2qt.) \div 3 = 160bu. 3pk. 0qt. 1\frac{1}{3}pt.$  2d one's share.  
 $482bu. 1pk. 2qt. + 160bu. 3pk. 0qt. 1\frac{1}{3}pt. = 643bu. 0pk. 2qt.$   
 $1\frac{1}{3}pt. ; 964bu. 2pk. 4qt. - 643bu. 0pk. 2qt. 1\frac{1}{3}pt. = 321bu. 2pk.$   
 $1qt. \frac{2}{3}pt.$  3d share.

( 91 )

$70^{\circ} 25'$	$105^{\circ} 30' 56''$	$156^{\circ} 26' 36''$
$46^{\circ} 50'$	$10^{\circ} 5' 40''$	$115^{\circ} 36' 36''$
$39^{\circ} 11' 36''$	$115^{\circ} 36' 36''$ West.	$40^{\circ} 50' 00''$ East.
$156^{\circ} 26' 36''$ East.		

$40^{\circ} 50' + 77^{\circ} = 117^{\circ} 50' = 7070'$  ;  $3^{\circ} 20' = 200'$  ;  $7070' \div 200'$   
 $= 35\frac{7}{10}$  days. *Ans.*

( 92 )

$\$25000 \div 125 = \$200$ , one share ;  $\$200 \times 12 = \$2400$  Captain's  
share ;  $\$200 \times 2 \times 5 = 2000$ , the Lieutenants' shares ;  $\$200 \times 6$   
 $\times 3 = \$3600$ , the Midshipmen's shares ;  $2400 + 2000 + 3600$   
 $= \$8000$  ;  $25000 - 8000 = \$17000$  ;  $17000 \div 85$   
 $= \$200$ , each sailor's share. *Ans.*

( 93 )

$1hr. = 15^{\circ}$  ;  $5m. 44sec. \div 4 = 1^{\circ} 26'$  ;  $15^{\circ} + 1^{\circ} 26'$   
 $= 16^{\circ} 26'$  Diff. in Long. ;  $71^{\circ} 4' + 16^{\circ} 26' = 87^{\circ} 30'$  *Ans.*

( 94 )

$8hr. 27m. 30sec. + 1hr. 5m. 44sec. = 9hr. 33m. 14sec.$  A.M.

( 95 )

$$12hr. - 1hr. 5m. 44sec. = 10hr. 54m. 16sec. \text{ Ans.}$$

( 96 )

$$1hr. \text{ in time} = 15^\circ; \text{ and } 16m. = 4^\circ; 15^\circ + 4^\circ = 19^\circ \text{ Ans.}$$

( 97 )

$$12 \times 16 \times 20 = 3840 \text{ E. E.}; 3840 \times 5 \div 4 = 4800yd. \text{ Ans.}$$

( 98 )

$$24lb. 4oz. 6pwt. 18grs. = 140322gr.; 11pwt. 9gr. = 273gr.; \\ 140322 \div 273 = 514 \text{ eagles. Ans.}$$

( 99 )

$$740 \times 2 = \$1480; \$3284.82 - \$1480 = \$1804.82; \$1804.82 \div \\ \$1.42 = 1271bu.; 1271 + 740 = 2011 \text{ bushels. Ans.}$$

( 100 )

He paid \$8968 for all the flour: to gain \$1060, he must receive  $8968 + 1060 = \$10028$ ; then,  $\$10028 - \$2618$  (what he received on the first sale,)  $= \$7410$ , what he must sell the remainder for.

( 101 )

$$105A. 2R. 20P. = 16900P.; 1 \times 16900 = \$16900; 16900 \times 1hr. \\ = 16900 \text{ hours} = 1yr. 338da. 22hr. \text{ Ans.}$$

## PROPERTIES OF NUMBERS.

( 1 )

$$3 \times 3; 2 \times 5; 2 \times 2 \times 3; 2 \times 7; 2 \times 2 \times 2 \times 2; 3 \times 3 \times 2; \\ 2 \times 2 \times 2 \times 3; 3 \times 3 \times 3; 2 \times 2 \times 7. \text{ Ans.}$$

( 2 )

$$2 \times 3 \times 5; 2 \times 11; 2 \times 2 \times 2 \times 2 \times 2; 3 \times 3 \times 2 \times 2; 2 \times 19; \\ 2 \times 2 \times 2 \times 5; 3 \times 3 \times 5; 7 \times 7. \text{ Ans.}$$

(3)

$2 \times 5 \times 5$ ;  $2 \times 2 \times 2 \times 7$ ;  $2 \times 29$ ;  $2 \times 2 \times 3 \times 5$ ;  $2 \times 2 \times 2 \times 2 \times 2$ ;  $2 \times 3 \times 11$ ;  $2 \times 2 \times 17$ ;  $2 \times 5 \times 7$ ;  $2 \times 2 \times 2 \times 3 \times 3$ .

(4)

$2 \times 2 \times 19$ ;  $2 \times 3 \times 13$ ;  $2 \times 2 \times 2 \times 2 \times 5$ ;  $2 \times 41$ ;  $2 \times 2 \times 3 \times 7$ ;  $2 \times 43$ ;  $2 \times 2 \times 2 \times 11$ ;  $2 \times 3 \times 3 \times 5$ . *Ans.*

(5)

$2 \times 2 \times 23$ ;  $2 \times 47$ ;  $2 \times 2 \times 2 \times 2 \times 2 \times 3$ ;  $2 \times 7 \times 7$ ;  $3 \times 3 \times 11$ ;  $2 \times 2 \times 5 \times 5$ ;  $2 \times 3 \times 17$ ;  $2 \times 2 \times 2 \times 13$ . *Ans.*

(6)

$3 \times 5 \times 7$ ;  $2 \times 53$ ;  $2 \times 2 \times 3 \times 3 \times 3$ ;  $2 \times 5 \times 11$ ;  $5 \times 23$ ;  $2 \times 2 \times 29$ ;  $2 \times 2 \times 2 \times 3 \times 5$ ;  $5 \times 5 \times 5$ . *Ans.*

(7)

$2 \times 151$ ;  $5 \times 61$ ;  $2 \times 2 \times 151$ ;  $5 \times 5 \times 5 \times 7$ ;  $3 \times 5 \times 5 \times 13$ ;  $5 \times 131$ . *Ans.*

(8)

*Ans.*  $5 \times 3 \times 2$ .

(9)

*Ans.*  $2 \times 3 \times 7$ .

(10)

*Ans.*  $3 \times 5 \times 7$ .

(11)

*Ans.*  $2 \times 3 \times 7$ 

(12)

*Ans.* 2.

(13)

*Ans.*  $2 \times 3 \times 5 \times 7$ 

## GREATEST COMMON DIVISOR.

(2)

 $2 \times 3 \times 3 = 18$ .

(3)

 $2 \times 2 \times 3 = 12$ .

(4)

5.

(5)

 $2 \times 3 = 6$ .

(6)

*Ans.*  $2 \times 5 = 10$ .

(7)

*Ans.*  $2 \times 2 \times 7 = 28$ .

(8)

*Ans.*  $7 \times 2 = 14$ .

(1)

*Ans.* 16.

(2)

*Ans.* 7.

(3)

*Ans.* 22.

(4)

*Ans.* 124.

( 5 )

*Ans.* 62.

( 6 )

*Ans.* 81.

( 7 )

It is plain that the number of bushels in each load must be the greatest common divisor of 315 and 810. That divisor is 45. *Ans.*

( 8 )

The question is, what extent of ground is that which will be contained an exact number of times in the two tracts : what is their greatest common divisor? *Ans.* 25 acres.

( 9 )

There are 1004 feet on one street, and 744 on the other. The panels belong to each front, and hence, the length of each must be the greatest common divisor of the two sides : viz., 12 feet. *Ans.*

( 10 )

The greatest common divisor of the three numbers will be the number of bushels to be put into each bag. That divisor is 3. *Ans.*

( 11 )

If each invests his whole money, the price of each cow must be a common divisor of the three sums, \$286, \$462, and \$638 : 2, 11, and 22 are common divisors, but only 22 will give the required number of cows, 63.

$286 \div 22 = 13$ , A bought ;  $462 \div 22 = 21$ , B bought ;  $638 \div 22 = 29$ , C bought. *Ans.*

## LEAST COMMON MULTIPLE.

( 1 )

5)4	9	10	15	18	20	21
3)4	9	2	3	18	4	21
2)4	3	2	1	6	4	7
3)2	3	1	1	3	2	7
2)2	1	1	1	1	2	7
1	1	1	1	1	1	7

$5 \times 3 \times 2 \times 3 \times 2 \times 7 = 1260$  *Ans.*

$$\begin{array}{r}
 \begin{array}{cccccccc}
 & & & (2) & & & & \\
 2)8 & 9 & 10 & 12 & 25 & 32 & 75 & 80 \\
 \hline
 2)4 & 9 & 5 & 6 & 25 & 16 & 75 & 40 \\
 \hline
 2)2 & 9 & 5 & 3 & 25 & 8 & 75 & 20 \\
 \hline
 2)1 & 9 & 5 & 3 & 25 & 4 & 75 & 10 \\
 \hline
 3)1 & 9 & 5 & 3 & 25 & 2 & 75 & 5 \\
 \hline
 5)1 & 3 & 5 & 1 & 25 & 2 & 25 & 5 \\
 \hline
 5)1 & 3 & 1 & 1 & 6 & 2 & 5 & 1 \\
 \hline
 1 & 3 & 1 & 1 & 1 & 2 & 1 & 1
 \end{array}
 \end{array}$$

$$2 \times 2 \times 2 \times 2 \times 3 \times 5 \times 5 \times 3 \times 2 = 7200. \text{ Ans.}$$

$$\begin{array}{llll}
 (3) & (4) & (5) & (6) \\
 \text{Ans. } 1260. & \text{Ans. } 1008. & \text{Ans. } 10500. & \text{Ans. } 10800.
 \end{array}$$

$$\begin{array}{llll}
 (7) & (8) & (9) & (10) \\
 \text{Ans. } 540. & \text{Ans. } 420. & \text{Ans. } 336. & \text{Ans. } 1176.
 \end{array}$$

$$\begin{array}{r}
 \begin{array}{ccc}
 3)9 & 12 & 16 \\
 \hline
 2)3 & 4 & 16 \\
 \hline
 2)3 & 2 & 8 \\
 \hline
 3 & 1 & 4
 \end{array}
 \end{array}$$

$$\begin{array}{l}
 (11) \\
 144 \div 9 = 16 \text{ days, A's time;} \\
 144 \div 12 = 12, \text{ B's time;} \\
 144 \div 16 = 9, \text{ C's time. } \text{Ans.}
 \end{array}$$

$$3 \times 2 \times 2 \times 3 \times 4 = 144 \text{ rods.}$$

(12)

The least amount that will pay either class for 1 month is the least common multiple of 15, 16, 21, and 24, which is \$1680; hence there are 112 men at \$15; 105 at \$16; 80 at \$21; 70 at \$24.

(13)

210 bushels. It would fill the bags 105 times; the barrels 70 times; the boxes 30 times; and the hogsheads 14 times.

(14)

$300 \div 15 = 20$  days, A's time to go around it;  $300 \div 20 = 15$  days, B's;  $300 \div 25 = 12$  days, C's;  $300 \div 30 = 10$  days, D's. The least common multiple of 20, 15, 12, 10 is 60 = the number of days before they all come together again.

$$\begin{array}{l}
 60 \times 15 \div 300 = 3, \text{ the number of times A will travel around it;} \\
 60 \times 20 \div 300 = 4, \text{ B's number of times;} \\
 60 \times 25 \div 300 = 5, \text{ C's number of times;} \\
 60 \times 30 \div 300 = 6, \text{ D's.}
 \end{array}$$



## CANCELLATION..

(1)

$$\begin{array}{r|l}
 2 & \\
 4^2 & \\
 \hline
 8 & 8 \\
 18 & 18 \\
 14 & 7 \\
 26 & 16 \\
 \hline
 32 & \text{Ans.}
 \end{array}$$

(2)

$$\begin{array}{r|l}
 6 & 12 \\
 4 & 3 \\
 \hline
 18 & 25^5 \\
 28 & 12 \\
 4 & 15 \\
 \hline
 3\frac{3}{4} & \text{Ans.}
 \end{array}$$

(3)

$$\begin{array}{r|l}
 6 & 125 \\
 36 & 60 \\
 \hline
 120 & 24 \\
 25 & 12^{14} \\
 \hline
 14 & \text{Ans.}
 \end{array}$$

(4)

$$\begin{array}{r|l}
 11 & 44^4 \\
 39 & 18^6 \\
 7 & 26^2 \\
 2 & 14 \\
 \hline
 48 & \text{Ans.}
 \end{array}$$

(5)

$$\begin{array}{r|l}
 57 & 240^{10} \\
 24 & 8^4 \\
 315 & 114^2 \\
 36 & 5 \\
 \hline
 9 & 80 \\
 \hline
 8\frac{8}{9} & \text{Ans.}
 \end{array}$$

(6)

$$\begin{array}{r|l}
 21 & 40^2 \\
 23 & 40^7 \\
 3 & 14 \\
 \hline
 4\frac{2}{3} & \text{Ans.}
 \end{array}$$

(7)

$$\begin{array}{r|l}
 96 & 192^2 \\
 22 & 88^4 \\
 \hline
 8 & \text{Ans.}
 \end{array}$$

(8)

$$\begin{array}{r|l}
 40 & 12^7 \\
 18 & 72 \\
 27 & 7 \\
 \hline
 45 & 7 \\
 \hline
 \frac{7}{45} & \text{Ans.}
 \end{array}$$

(9)

$$\begin{array}{r|l}
 175 & 240^{16} \\
 66 & 111 \\
 27 & 16^2 \\
 \hline
 5 & 32 \\
 \hline
 6\frac{1}{2} & \text{Ans.}
 \end{array}$$

(10)

$$\begin{array}{r|l}
 600 & 840^3 \\
 32 & 64 \\
 31 & 124 \\
 4 & 9 \\
 \hline
 27 & \text{Ans.}
 \end{array}$$

(11)

$$\begin{array}{r|l}
 14 & 18^9 \\
 \hline
 9 & \text{dozens. A.}
 \end{array}$$

(12)

$$\begin{array}{r|l}
 40 & 4 \\
 6 & 9 \\
 \hline
 36 & \text{lbs. Ans.}
 \end{array}$$

(13)

$$\begin{array}{r|l}
 1,844^6 & \\
 48 & 12 \\
 \hline
 \text{Ans.} & 46 \text{ bushels.}
 \end{array}$$

(14)

$$\begin{array}{r|l}
 66 & 175 \\
 25 & 4 \\
 \hline
 8 & \\
 \hline
 \text{Ans.} & 4 \text{ firkins.}
 \end{array}$$

(15)

$$\begin{array}{r|l}
 10 & \\
 12 & 20^5 \\
 3 & 50 \\
 \hline
 \text{Ans.} & 16\frac{2}{3} \text{ days.}
 \end{array}$$

$$\begin{array}{r}
 \text{(16)} \\
 \begin{array}{r}
 3,50 \quad | \quad 10,50 \\
 30 \quad | \quad 50^3 \\
 \hline
 \text{Ans. } 8 \text{ pieces.}
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(17)} \\
 87 + 60 + 45 = 1,92. \\
 \begin{array}{r}
 2 \quad | \quad 1,92 \\
 1,92 \quad | \quad 492^{41} \\
 \hline
 2 \quad | \quad 943 \\
 471\frac{1}{2} \text{ bushels.}
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(18)} \\
 \begin{array}{r}
 100 \quad | \quad 250^5 \\
 7 \quad | \quad 42^3 \\
 \hline
 \text{Ans. } 15 \text{ bar.}
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(19)} \\
 \begin{array}{r}
 40 \quad | \quad 2400^{207} \\
 120 \quad | \quad 30 \\
 \hline
 \text{Ans. } 6210 \text{ bushels.}
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(20)} \\
 \begin{array}{r}
 10 \quad | \quad 12^3 \\
 4 \quad | \quad 9 \\
 \hline
 \text{Ans. } 6\frac{3}{4} \text{ bushels.}
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(21)} \\
 \begin{array}{r}
 2 \quad | \quad 14^7 \\
 40 \quad | \quad 5 \\
 \hline
 2 \quad | \quad 35 \\
 \text{Ans. } 17\frac{1}{2} \text{ bushels.}
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(22)} \\
 \begin{array}{r}
 4 \quad | \quad 27^3 \\
 30 \quad | \quad 15 \\
 \hline
 4 \quad | \quad 35 \\
 \text{Ans. } 11\frac{1}{4} \text{ days.}
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(23)} \\
 \begin{array}{r}
 2 \quad | \quad 72 \\
 20 \quad | \quad 12^3 \\
 \hline
 2 \quad | \quad 9 \\
 \text{Ans. } 4\frac{1}{2} \text{ boxes.}
 \end{array}
 \end{array}$$

## OF FRACTIONS.

(1)

Eight-ninths; seven-twelfths; five-thirds; six-fifteenths; twenty-one-ninths; sixteen-sevenths; eighteen one-hundred fourths.

$$\text{(2)} \\
 \text{Ans. } \frac{15}{16}; \frac{37}{40}.$$

$$\text{(3)} \\
 \text{Ans. } \frac{27}{40}; \frac{95}{40}; \frac{106}{40}; \frac{37}{40}; \frac{11}{40}.$$

$$\text{(4)} \\
 \text{A. } \frac{45}{88}; \frac{56}{88}; \frac{85}{88}; \frac{95}{88}; \frac{37}{88}.$$

$$\text{(5)} \\
 \text{A. } \frac{9}{80}; \frac{87}{80}; \frac{75}{80}; \frac{65}{80}; \frac{85}{80}; \frac{90}{80}; \frac{100}{80}.$$

$$\text{(1)} \\
 \frac{2}{3} \times 6 = 1\frac{2}{3}; \frac{2}{3} \times 7 = 2\frac{1}{3}. \text{ Ans.}$$

$$\text{(2)} \\
 \frac{7}{8} \times 4 = 2\frac{2}{8}; \frac{7}{8} \times 9 = 6\frac{3}{8}. \text{ Ans.}$$

$$\text{(3)} \\
 \frac{5}{31} \times 11 = 1\frac{5}{31}; \frac{5}{31} \times 12 = 1\frac{20}{31}. \text{ Ans.}$$

$$\text{(4)} \\
 \frac{7}{15} \times 12 = 5\frac{4}{5}; \frac{7}{15} \times 14 = 6\frac{2}{5}. \text{ Ans.}$$

(5)

$$\frac{47}{5} \times 3 = \frac{141}{5}; \frac{47}{5} \times 4 = \frac{188}{5}. \text{ Ans.}$$

(6)

$$\frac{14}{9} \times 7 = \frac{98}{9}; \frac{14}{9} \times 9 = \frac{126}{9}. \text{ Ans.}$$

(7)

$$\frac{47}{8} \times 5 = \frac{235}{8}; \frac{47}{8} \times 10 = \frac{470}{8}. \text{ Ans.}$$

(8)

$$\frac{27}{9} \times 3 = \frac{81}{9}; \frac{27}{9} \times 11 = \frac{297}{9}. \text{ Ans.}$$

(1)

$$\frac{5}{8} \times 2 = \frac{10}{8} = 1\frac{1}{4}; \frac{5}{8} \times 4 = \frac{20}{8} = 2\frac{1}{2}. \text{ Ans.}$$

(2)

$$\frac{17}{8} \times 8 = \frac{136}{8} = 17; \frac{17}{8} \times 4 = \frac{68}{8} = 8\frac{1}{2}; \frac{17}{8} \times 2 = \frac{34}{8} = 4\frac{1}{4}. \text{ Ans.}$$

(3)

$$\frac{9}{24} \times 2 = \frac{18}{24}; \frac{9}{24} \times 3 = \frac{27}{24}; \frac{9}{24} \times 4 = \frac{36}{24}; \frac{9}{24} \times 6 = \frac{54}{24}; \frac{9}{24} \times 8 = \frac{72}{24}.$$

(4)

$$\frac{7}{30} \times 6 = \frac{42}{30}; \frac{7}{30} \times 5 = \frac{35}{30}; \frac{7}{30} \times 10 = \frac{70}{30}; \frac{7}{30} \times 15 = \frac{105}{30}. \text{ Ans.}$$

(5)

$$\frac{17}{8} \times 2 = \frac{34}{8}; \frac{17}{8} \times 3 = \frac{51}{8}; \frac{17}{8} \times 4 = \frac{68}{8}; \frac{17}{8} \times 6 = \frac{102}{8};$$

$$\frac{17}{8} \times 8 = \frac{136}{8}; \frac{17}{8} \times 12 = \frac{204}{8}; \frac{17}{8} \times 16 = \frac{272}{8}; \frac{17}{8} \times 24 = \frac{408}{8}. \text{ Ans.}$$

(6)

$$\frac{6}{40} \times 2 = \frac{12}{40}; \frac{6}{40} \times 4 = \frac{24}{40}; \frac{6}{40} \times 5 = \frac{30}{40}; \frac{6}{40} \times 10 = \frac{60}{40}; \frac{6}{40} \times 20 = \frac{120}{40}.$$

(7)

$$\frac{7}{35} \times 7 = \frac{49}{35}; \frac{7}{35} \times 5 = \frac{35}{35}. \text{ Ans.}$$

(8)

$$\frac{6}{22} \times 21 = \frac{126}{22}; \frac{6}{22} \times 6 = \frac{36}{22}; \frac{6}{22} \times 7 = \frac{42}{22}; \frac{6}{22} \times 3 = \frac{18}{22}; \frac{6}{22} \times 2 = \frac{12}{22}.$$

(9)

$$\frac{19}{36} \times 2 = \frac{38}{36}; \frac{19}{36} \times 3 = \frac{57}{36}; \frac{19}{36} \times 4 = \frac{76}{36}; \frac{19}{36} \times 6 = \frac{114}{36};$$

$$\frac{19}{36} \times 9 = \frac{171}{36}; \frac{19}{36} \times 12 = \frac{228}{36}. \text{ Ans.}$$

(1)

$$\frac{12}{15} \div 2 = \frac{2}{5}; \frac{16}{15} \div 4 = \frac{4}{15}; \frac{16}{15} \div 8 = \frac{2}{15}; \frac{16}{15} \div 16 = \frac{1}{15}. \text{ Ans.}$$

(2)

$$\frac{14}{11} \div 2 = \frac{7}{11}; \frac{14}{11} \div 7 = \frac{2}{11}; \frac{14}{11} \div 14 = \frac{1}{11}. \text{ Ans.}$$

(3)

$$\frac{20}{15} \div 2 = \frac{4}{3}; \frac{20}{15} \div 5 = \frac{4}{15}; \frac{20}{15} \div 4 = \frac{5}{15}; \frac{20}{15} \div 10 = \frac{2}{15}. \text{ Ans.}$$

(4)

$$\frac{60}{24} \div 5 = \frac{12}{24}; \frac{60}{24} \div 6 = \frac{10}{24}; \frac{60}{24} \div 10 = \frac{6}{24}; \frac{60}{24} \div 15 = \frac{4}{24};$$

$$\frac{60}{24} \div 20 = \frac{3}{24}. \text{ Ans.}$$

(5)

$$\frac{18}{15} \div 2 = \frac{9}{15}; \frac{18}{15} \div 3 = \frac{6}{15}; \frac{18}{15} \div 6 = \frac{3}{15}; \frac{18}{15} \div 9 = \frac{2}{15}. \text{ Ans.}$$

(6)

$$\frac{24}{15} \div 3 = \frac{8}{15}; \frac{24}{15} \div 6 = \frac{4}{15}; \frac{24}{15} \div 8 = \frac{3}{15}; \frac{24}{15} \div 12 = \frac{2}{15}. \text{ Ans.}$$

(7)

$$\frac{27}{15} \div 3 = \frac{9}{15}; \frac{27}{15} \div 9 = \frac{3}{15}; \frac{27}{15} \div 27 = \frac{1}{15}. \text{ Ans.}$$

(8)

$$\frac{54}{15} \div 6 = \frac{9}{15}; \frac{54}{15} \div 9 = \frac{6}{15}; \frac{54}{15} \div 27 = \frac{2}{15}; \frac{54}{15} \div 54 = \frac{1}{15}. \text{ Ans.}$$

(1)

$$\frac{3}{4} \div 6 = \frac{3}{24}; \frac{3}{4} \div 7 = \frac{3}{28}; \frac{3}{4} \div 8 = \frac{3}{32}. \text{ Ans.}$$

(2)

$$\frac{4}{5} \div 5 = \frac{4}{25}; \frac{4}{5} \div 4 = \frac{4}{20}; \frac{4}{5} \div 9 = \frac{4}{45}. \text{ Ans.}$$

(3)

$$\frac{14}{11} \div 3 = \frac{14}{33}; \frac{14}{11} \div 4 = \frac{7}{22}; \frac{14}{11} \div 12 = \frac{7}{66}. \text{ Ans.}$$

(4)

$$\frac{29}{17} \div 6 = \frac{29}{102}; \frac{29}{17} \div 8 = \frac{29}{136}; \frac{29}{17} \div 11 = \frac{29}{187}. \text{ Ans.}$$

(5)

$$\frac{14}{17} \div 7 = \frac{14}{119}; \frac{14}{17} \div 5 = \frac{14}{85}; \frac{14}{17} \div 3 = \frac{14}{51}. \text{ Ans.}$$

(6)

$$\frac{14}{17} \div 7 = \frac{14}{119}; \frac{14}{17} \div 8 = \frac{14}{136}; \frac{14}{17} \div 6 = \frac{14}{102}. \text{ Ans.}$$

(7)

$$\frac{25}{18} \div 3 = \frac{25}{54}; \frac{25}{18} \div 7 = \frac{25}{126}; \frac{25}{18} \div 11 = \frac{25}{198}. \text{ Ans.}$$

(8)

$$\frac{11}{18} \div 8 = \frac{11}{144}; \frac{11}{18} \div 4 = \frac{11}{72}; \frac{11}{18} \div 10 = \frac{11}{180}. \text{ Ans.}$$

(1)

$$\text{Ans. } \frac{22}{15}; \frac{42}{15}; \frac{25}{15}.$$

(2)

$$\text{Ans. } \frac{12}{15}; \frac{24}{15}; \frac{32}{15}; \frac{28}{15}.$$

(3)

$$\text{Ans. } \frac{112}{15}; \frac{122}{15}; \frac{144}{15}.$$

(4)

$$\text{Ans. } \frac{70}{15}; \frac{112}{15}; \frac{84}{15}; \frac{102}{15}.$$

(5)

$$\text{Ans. } \frac{42}{15}; \frac{92}{15}; \frac{22}{15}; \frac{112}{15}.$$

(1)

$$\text{Ans. } \frac{2}{15}; \frac{1}{15}.$$

(2)

$$\text{Ans. } \frac{1}{15}.$$

(3)

$$\text{Ans. } \frac{12}{15}; \frac{9}{15}; \frac{5}{15}; \frac{4}{15}; \frac{2}{15}.$$

(4)

$$\text{Ans. } \frac{24}{15}; \frac{12}{15}; \frac{4}{15}; \frac{2}{15}.$$

(5)

$$\text{Ans. } \frac{26}{15}; \frac{24}{15}; \frac{12}{15}; \frac{12}{15}; \frac{8}{15}.$$

(6)

$$\text{Ans. } \frac{11}{15}; \frac{12}{15}; \frac{2}{15}; \frac{2}{15}; \frac{1}{15}.$$

$$\begin{array}{lll} (1) & (2) & (3) \\ \frac{7}{49} = \frac{1}{7}. \text{ Ans.} & \frac{84}{420} = \frac{1}{5}. \text{ Ans.} & \frac{194}{117} = \frac{1}{6}. \text{ Ans.} \end{array}$$

$$\begin{array}{lll} (4) & (5) & (6) \\ \frac{1949}{8342} = \frac{1}{8}. \text{ Ans.} & \frac{275}{440} = \frac{5}{8}. \text{ Ans.} & \frac{35}{105} = \frac{1}{3}. \text{ Ans.} \end{array}$$

$$\begin{array}{lll} (7) & (8) & (9) \\ \frac{172}{118} = \frac{2}{3}. \text{ Ans.} & \frac{63}{81} = \frac{7}{9}. \text{ Ans.} & \frac{315}{405} = \frac{7}{9}. \text{ Ans.} \end{array}$$

$$\begin{array}{lll} (10) & (11) & (12) \\ \frac{1157}{623} = \frac{13}{7}. \text{ Ans.} & \frac{792}{1386} = \frac{4}{7}. \text{ Ans.} & \frac{374}{1030} = \frac{197}{515}. \text{ Ans.} \end{array}$$

$$\begin{array}{lll} (13) & (14) & (15) \\ \frac{410}{510} = \frac{41}{51}. \text{ Ans.} & \frac{345}{1745} = \frac{69}{349}. \text{ Ans.} & \frac{8343}{9747} = \frac{309}{351}. \text{ Ans.} \end{array}$$

$$\begin{array}{lll} (16) & (17) & (18) \\ \frac{549}{7143} = \frac{183}{2381}. \text{ Ans.} & \frac{2160}{9360} = \frac{1}{4}. \text{ Ans.} & \frac{315}{1152} = \frac{5}{24}. \text{ Ans.} \end{array}$$

$$\begin{array}{ll} (19) & (20) \\ \frac{10560}{35520} = \frac{1}{3}. \text{ Ans.} & \frac{6048}{38592} = \frac{1}{6}. \text{ Ans.} \end{array}$$

$$\begin{array}{ll} (21) & (22) \\ \frac{864}{21600} = \frac{1}{25}. \text{ Ans.} & \frac{1080}{66420} = \frac{2}{117}. \text{ Ans.} \end{array}$$

$$\begin{array}{lll} (1) & (2) & (3) \\ \frac{108}{63} = 1\frac{5}{7}. \text{ Ans.} & \frac{576}{48} = 12. \text{ Ans.} & \frac{1764}{324} = 5\frac{4}{9}. \text{ Ans.} \end{array}$$

$$\begin{array}{lll} (4) & (5) & (6) \\ \frac{19900}{800} = 24\frac{7}{8}. \text{ Ans.} & \frac{135}{15} = 9\text{ lb.} \text{ Ans.} & \frac{2358}{45} = 52\frac{1}{5} \text{ da.} \text{ Ans.} \end{array}$$

$$\begin{array}{ll} (7) & (8) \\ \frac{6284}{58} = 112\frac{3}{14} \text{ yards.} \text{ Ans.} & \frac{4976}{224} = 22\frac{3}{4}. \text{ Ans.} \end{array}$$

$$\begin{array}{ll} (9) & (10) \\ \frac{102409}{160} = 640\frac{9}{160} \text{ acres.} \text{ Ans.} & \frac{4478}{841} = 5\frac{213}{841}. \text{ Ans.} \end{array}$$

(11)

$$\frac{17959}{1258} = 14\frac{275}{1258}. \text{ Ans.}$$

(12)

$$\frac{526959}{2343} = 225. \text{ Ans.}$$

(13)

$$\frac{4790}{25} = 191\frac{2}{5}. \text{ Ans.}$$

(14)

$$\frac{1512}{108} = 14. \text{ Ans.}$$

(15)

$$\frac{375941}{999} = 376\frac{11}{999}. \text{ Ans.}$$

(16)

$$\frac{3745174}{349} = 10731\frac{55}{349}. \text{ Ans.}$$

(1)

$$39\frac{7}{8} = 39\frac{7}{8}. \text{ Ans.}$$

(2)

$$112\frac{9}{10} = 112\frac{9}{10}. \text{ Ans.}$$

(3)

$$427\frac{11}{24} = 427\frac{11}{24}. \text{ Ans.}$$

(4)

$$676\frac{37}{51} = 676\frac{37}{51}. \text{ Ans.}$$

(5)

$$367\frac{2}{104} = 367\frac{17}{104}. \text{ Ans.}$$

(6)

$$847\frac{36}{175} = 847\frac{36}{175}. \text{ Ans.}$$

(7)

$$68426\frac{368}{875} = 68426\frac{368}{875}. \text{ Ans.}$$

(8)

$$675\frac{187}{200} = 675\frac{187}{200}. \text{ Ans.}$$

(9)

$$187\frac{41}{121} = 187\frac{41}{121}. \text{ Ans.}$$

(10)

$$149\frac{5}{9} = 149\frac{5}{9}. \text{ Ans.}$$

(11)

$$375\frac{24}{99} = 375\frac{24}{99}. \text{ Ans.}$$

(12)

$$17494\frac{443}{9999} = 17494\frac{443}{9999}. \text{ Ans.}$$

(13)

$$4834\frac{57}{95} = 4834\frac{57}{95}. \text{ Ans.}$$

(14)

$$1789\frac{5}{9} = 1789\frac{5}{9}. \text{ Ans.}$$

(15)

$$125\frac{8}{7} = 125\frac{8}{7}. \text{ Ans.}$$

(16)

$$375\frac{3}{4} = 375\frac{3}{4}. \text{ Ans.}$$

(17)

$$464\frac{19}{83} = 464\frac{19}{83}. \text{ Ans.}$$

(18)

$$96\frac{11}{40} = 96\frac{11}{40}. \text{ Ans.}$$

(19)

$$984\frac{41}{112} = 984\frac{41}{112}. \text{ Ans.}$$

(20)

$$35\frac{72}{88} = 35\frac{72}{88}. \text{ Ans.}$$

(21)	(22)	(23)
$87\frac{41}{135} = 117\frac{86}{135}$ Ans.	$77\frac{1}{7} = 78$ Ans.	$333\frac{2}{3} = 334$ Ans.
(1)	(2)	(3)
$18 = 17\frac{6}{7}$ Ans.	$25 = 24\frac{9}{10}$ Ans.	$19 = 18\frac{2}{3}$ Ans.
(4)	(5)	(6)
$29 = 28\frac{6}{14}$ Ans.	$65 = 64\frac{9}{17}$ Ans.	$145 = 144\frac{5}{9}$ Ans.
(7)	(8)	(9)
$450 = 449\frac{9}{10}$ Ans.	$327 = 326\frac{712}{80}$ Ans.	$97 = 96\frac{116}{128}$ Ans.

(10)	(11)
$167 = 166\frac{63}{80}$ Ans.	$325 = 324\frac{75}{78}$ Ans.

(1)	(2)
$\frac{3}{2}$ of $\frac{5}{6}$ of $\frac{2}{3} = \frac{5}{12}$ Ans.	$\frac{2}{5}$ of $\frac{7}{9}$ of $\frac{3}{4} = \frac{7}{30}$ Ans.

(3)

$$\frac{2}{3} \text{ of } \frac{3}{7} \text{ of } \frac{9}{2} = \frac{9}{14} \text{ Ans.}$$

(4)	(5)	(6)
$\begin{array}{r l} 9 & 2 \\ 2 & 3 \\ 3 & 5 \\ 3 & 10 \end{array}$	$\begin{array}{r l} 2 & 3 \\ 10 & 3 \\ 3 & 2 \\ 8 & 7 \\ 14 & 5 \end{array}$	$\begin{array}{r l} 4 & 1 \\ 2 & 1 \\ 4 & 3 \\ 2 & 25 \end{array}$
$18 \mid 5 = 1\frac{5}{18}$ A.	$16 \mid 3 = 1\frac{3}{16}$ A.	$64 \mid 75 = 1\frac{3}{4}$ A.

(7)	(8)	(9)
$\begin{array}{r l} 7 & 2 \\ 3 & 5 \\ 5 & 21 \end{array}$	$\begin{array}{r l} 2 & 11 \\ 10 & 11 \\ 3 & 22 \\ 2 & 13 \\ 12 & 65 \end{array}$	$\begin{array}{r l} 4 & 7 \\ 3 & 7 \\ 3 & 23 \\ 7 & 3 \\ 5 & 45 \\ 5 & 7 \end{array}$
$1 \mid 1 = 1$ A.	$4 \mid 143 = 143\frac{3}{4} = 35\frac{3}{4}$ A.	$1 \mid 147 = 147$ A.

(10)

$$\begin{array}{r|l} 6 & 14 \\ 12 & 7 \\ 3 & 7 \\ 6 & 106 \end{array}$$

$$6 \mid 49 = 8\frac{1}{6} = 8\frac{1}{6} \text{ Ans.}$$

(11)

$$\begin{array}{r|l} 2 & 4 \\ 4 & 3 \\ 3 & 5 \\ 3 & 5 \\ 100 & 27 \\ 13 & 5 \end{array}$$

$$416 \mid 15 = 1\frac{5}{16} \text{ Ans.}$$



$$\begin{array}{r|l}
 (12) & \\
 110 & 41 \\
 4 \times 10 & 5 \\
 100 & 57 \\
 7 & 5 \\
 \hline
 3080 & 41 = 3080. \quad \text{Ans.}
 \end{array}$$

$$\begin{array}{r|l}
 (13) & \\
 8 & 29 \\
 43 & 7 \\
 101 & 5 \\
 1 & 4 \\
 \hline
 43 & 580 = \frac{580}{43} = 13\frac{21}{43}.
 \end{array}$$

$$(1) \quad \frac{3}{4}, \frac{16}{3}, \frac{6}{7} = \frac{63}{84}, \frac{448}{84}, \frac{72}{84}. \quad \text{Ans.}$$

$$(2) \quad \frac{3}{2}, \frac{2}{3}, \frac{1}{4}, \frac{5}{6} = \frac{175}{216}, \frac{144}{216}, \frac{54}{216}, \frac{525}{216}. \quad \text{Ans.}$$

$$(3) \quad \frac{19}{2}, \frac{13}{3}, \frac{1}{4}, \frac{4}{5} = \frac{579}{60}, \frac{260}{60}, \frac{165}{60}, \frac{48}{60}. \quad \text{Ans.}$$

$$(4) \quad \frac{3}{4}, \frac{7}{6}, \frac{5}{8}, \frac{1}{5}, \frac{2}{4} = \frac{15}{24}, \frac{35}{24}, \frac{20}{24}, \frac{12}{24}, \frac{54}{24}. \quad \text{Ans.}$$

$$(5) \quad \frac{15}{2}, \frac{6}{7}, \frac{4}{8}, \frac{3}{5} = \frac{4725}{840}, \frac{540}{840}, \frac{280}{840}, \frac{378}{840}. \quad \text{Ans.}$$

$$(6) \quad 2\frac{1}{2} \text{ of } 3\frac{1}{2} \text{ of } \frac{2}{3} = \frac{110}{21}; \quad 6\frac{1}{2} \text{ of } \frac{3}{2} = \frac{19}{2}, \quad \frac{19}{21}, \quad \frac{19}{2} = \frac{220}{42}, \quad \frac{320}{42}. \quad \text{Ans.}$$

$$(7) \quad \frac{3}{4} \text{ of } \frac{2}{3} \text{ of } \frac{5}{8} = \frac{5}{24}; \quad \frac{3}{4} \text{ of } \frac{5}{7} \text{ of } \frac{2}{3} = \frac{5}{28}, \quad \frac{5}{28}, \quad \frac{5}{28}. \quad \text{Ans.}$$

$$(8) \quad \frac{44}{5}, \frac{7}{3}, \frac{11}{2}, \frac{6}{1} = \frac{38}{18}, \quad \frac{42}{18}, \quad \frac{99}{18}, \quad \frac{108}{18}. \quad \text{Ans.}$$

$$(9) \quad \frac{26}{5}, \frac{6}{2}, \frac{7}{2}, \frac{11}{3} = \frac{156}{30}, \quad \frac{36}{30}, \quad \frac{105}{30}, \quad \frac{110}{30}. \quad \text{Ans.}$$

$$(10) \quad \frac{3}{4} \text{ of } 5\frac{1}{2} = \frac{15}{2}; \quad \frac{1}{2} \text{ of } 3\frac{1}{2} = \frac{7}{4}; \quad \frac{7}{12} \text{ of } 8\frac{1}{2} = \frac{119}{24}; \quad \frac{15}{4}, \quad \frac{77}{24}, \quad \frac{119}{24}, \\ = \frac{672}{188}, \quad \frac{264}{188}, \quad \frac{832}{188}. \quad \text{Ans.}$$

$$(11) \quad 6\frac{1}{2} \text{ of } 2 = \frac{28}{2}; \quad \frac{28}{3}, \quad \frac{2}{7}, \quad \frac{43}{7}, \quad \frac{1}{3} = \frac{266}{21}, \quad \frac{9}{21}, \quad \frac{129}{21}, \quad \frac{7}{21}. \quad \text{Ans.}$$

$$(1) \quad \frac{3}{2}, \quad \frac{7}{12}, \quad \frac{1}{2}, \quad \frac{5}{6} = \frac{9}{12}, \quad \frac{7}{12}, \quad \frac{6}{12}, \quad \frac{10}{12}. \quad \text{Ans.}$$

(2)

$$\frac{6}{7}, \frac{8}{21}, \frac{2}{3} = \frac{18}{21}, \frac{8}{21}, \frac{14}{21}. \text{ Ans.}$$

(3)

$$\frac{21}{5}, \frac{9}{10}, \frac{22}{4} = \frac{84}{20}, \frac{18}{20}, \frac{145}{20}. \text{ Ans.}$$

(4)

$$\frac{25}{5}, \frac{5}{8}, \frac{22}{3} = \frac{120}{120}, \frac{15}{120}, \frac{132}{120}. \text{ Ans.}$$

(5)

$$\frac{31}{5}, \frac{5}{8}, \frac{22}{3} = \frac{186}{30}, \frac{25}{30}, \frac{220}{30}. \text{ Ans.}$$

(6)

$$\frac{4}{5}, \frac{7}{8}, \frac{22}{3}, \frac{15}{4} = \frac{32}{40}, \frac{35}{40}, \frac{580}{40}, \frac{150}{40}. \text{ Ans.}$$

(7)

$$\frac{7}{12}, \frac{8}{9}, \frac{17}{6}, \frac{11}{8} = \frac{42}{72}, \frac{64}{72}, \frac{204}{72}, \frac{99}{72}. \text{ Ans.}$$

(8)

$$\frac{6}{7}, \frac{1}{6}, \frac{16}{21}, \frac{2}{3} = \frac{36}{42}, \frac{7}{42}, \frac{32}{42}, \frac{28}{42}. \text{ Ans.}$$

(9)

$$\frac{9}{11}, \frac{3}{4}, \frac{10}{22}, \frac{1}{2} = \frac{36}{44}, \frac{33}{44}, \frac{22}{44}, \frac{22}{44}. \text{ Ans.}$$

(10)

$$\frac{5}{2}, \frac{3}{8}, \frac{9}{10}, \frac{52}{12} = \frac{150}{60}, \frac{210}{60}, \frac{54}{60}, \frac{265}{60}. \text{ Ans.}$$

(1)

$$2) \frac{2}{8}, \frac{4}{7}, \frac{5}{12} = \frac{63}{168}, \frac{96}{168}, \frac{70}{168}.$$

$$\begin{array}{r} 2 \overline{) 4 \ 7 \ 6} \\ 2 \ 7 \ 3 \end{array}$$

$$2 \times 2 \times 2 \times 7 \times 3 = 168.$$

(2)

$$7) \frac{5}{12}, \frac{3}{7}, \frac{16}{21} = \frac{15}{42}, \frac{18}{42}, \frac{32}{42}.$$

$$\begin{array}{r} 7 \overline{) 1 \ 2 \ 3} \\ 2 \ 1 \ 3 \end{array}$$

$$7 \times 2 \times 3 = 42.$$

(3)

$$2) \frac{11}{4}, \frac{5}{16}, \frac{9}{32} = \frac{88}{32}, \frac{10}{32}, \frac{9}{32}.$$

$$\begin{array}{r} 2 \overline{) 2 \ 8 \ 16} \\ 2 \ 1 \ 4 \ 8 \end{array}$$

$$\begin{array}{r} 2 \overline{) 1 \ 4 \ 8} \\ 2 \ 1 \ 2 \ 4 \end{array}$$

$$\begin{array}{r} 2 \overline{) 1 \ 2 \ 4} \\ 2 \ 1 \ 1 \ 2 \end{array}$$

$$2 \times 2 \times 2 \times 2 \times 2 = 32.$$

(4)

$$3) \frac{43}{8}, \frac{53}{12}, \frac{7}{24} = \frac{129}{24}, \frac{106}{24}, \frac{7}{24}.$$

$$\begin{array}{r} 3 \overline{) 8 \ 4 \ 8} \\ 2 \overline{) 4 \ 2 \ 4} \\ 2 \overline{) 2 \ 1 \ 2} \end{array}$$

$$\begin{array}{r} 3 \overline{) 1 \ 1 \ 1} \\ 1 \ 1 \ 1 \end{array}$$

$$3 \times 2 \times 2 \times 2 = 24.$$

(5)

$$\begin{array}{r} 5) \frac{127}{15}, \frac{2}{3}, \frac{7}{30} = \frac{254}{30}, \frac{12}{30}, \frac{7}{30}. \\ 3) \frac{3}{3} \frac{1}{3} \frac{6}{3} \\ \hline 1 \quad 1 \quad 2 \end{array}$$

$$5 \times 3 \times 2 = 30.$$

(6)

$$\begin{array}{r} 11) \frac{197}{11}, \frac{2}{11}, \frac{5}{33} = \frac{642}{66}, \frac{8}{66}, \frac{10}{66}. \\ \hline 1 \quad 2 \quad 3 \end{array}$$

$$11 \times 2 \times 3 = 66.$$

(7)

$$\begin{array}{r} 7) \frac{5}{7}, \frac{68}{21}, \frac{1}{14} = \frac{105}{42}, \frac{136}{42}, \frac{3}{42}. \\ 2) \frac{2}{2} \frac{3}{2} \frac{2}{2} \\ \hline 1 \quad 3 \quad 1 \end{array}$$

$$7 \times 2 \times 3 = 42.$$

(8)

$$\begin{array}{r} 2) \frac{41}{2}, \frac{7}{2}, \frac{2}{8}, \frac{9}{16} = \frac{164}{48}, \frac{56}{48}, \frac{18}{48}, \frac{27}{48}. \\ 2) \frac{6}{2} \frac{3}{2} \frac{4}{2} \frac{8}{2} \\ 3) \frac{3}{3} \frac{3}{3} \frac{2}{3} \frac{4}{3} \\ 2) \frac{1}{2} \frac{1}{2} \frac{2}{2} \frac{4}{2} \\ \hline 1 \quad 1 \quad 1 \quad 2 \end{array}$$

$$2 \times 2 \times 3 \times 2 \times 2 = 48.$$

(9)

$$\begin{array}{r} 3) \frac{2}{3}, \frac{5}{27}, \frac{7}{36} = \frac{36}{108}, \frac{20}{108}, \frac{21}{108}. \\ 3) \frac{3}{3} \frac{9}{3} \frac{12}{3} \\ \hline 1 \quad 3 \quad 4 \end{array}$$

$$3 \times 3 \times 3 \times 4 = 108.$$

(10)

$$\begin{array}{r} 13) \frac{22}{13}, \frac{185}{26}, \frac{5}{52} = \frac{348}{78}, \frac{555}{78}, \frac{10}{78}. \\ \hline 1 \quad 2 \quad 3 \end{array}$$

$$13 \times 2 \times 3 = 78.$$

(11)

$$\begin{array}{r} 3) \frac{31}{3}, \frac{112}{18}, \frac{27}{36} = \frac{124}{36}, \frac{226}{36}, \frac{27}{36}. \\ 3) \frac{3}{3} \frac{6}{3} \frac{12}{3} \\ 2) \frac{1}{2} \frac{2}{2} \frac{4}{2} \\ \hline 1 \quad 1 \quad 2 \end{array}$$

$$3 \times 3 \times 2 \times 2 = 36.$$

(12)

$$\begin{array}{r} 5) \frac{22}{5}, \frac{87}{10}, \frac{42}{20} = \frac{128}{20}, \frac{174}{20}, \frac{42}{20}. \\ 2) \frac{1}{2} \frac{2}{2} \frac{4}{2} \\ \hline 1 \quad 1 \quad 2 \end{array}$$

$$5 \times 2 \times 2 = 20.$$

(13)

$$\begin{array}{r} 11) \frac{58}{11}, \frac{125}{22}, \frac{2}{33} = \frac{354}{66}, \frac{405}{66}, \frac{4}{66}. \\ \hline 1 \quad 2 \quad 3 \end{array}$$

$$11 \times 2 \times 3 = 66.$$

(14)

$$\begin{array}{r} 17) \frac{9}{17}, \frac{71}{34}, \frac{73}{68} = \frac{36}{68}, \frac{142}{68}, \frac{73}{68}. \\ 2) \frac{1}{2} \frac{2}{2} \frac{4}{2} \\ \hline 1 \quad 1 \quad 2 \end{array}$$

$$17 \times 2 \times 2 = 68.$$

(15)

$$\begin{array}{r} 3) \frac{52}{3}, \frac{112}{18}, \frac{7}{36}, \frac{1}{72} = \frac{416}{72}, \frac{452}{72}, \frac{14}{72}, \frac{1}{72}. \\ 3) \frac{3}{3} \frac{6}{3} \frac{12}{3} \frac{24}{3} \\ 2) \frac{1}{2} \frac{2}{2} \frac{4}{2} \frac{8}{2} \\ 2) \frac{1}{2} \frac{1}{2} \frac{2}{2} \frac{4}{2} \\ \hline 1 \quad 1 \quad 1 \quad 2 \end{array}$$

$$3 \times 3 \times 2 \times 2 \times 2 = 72.$$

## ADDITION OF COMMON FRACTIONS.

(1)

$$\frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{1}{3} = 5\frac{2}{3}. \text{ Ans.}$$

(2)

$$\frac{5}{9} + \frac{1}{9} + \frac{2}{9} + \frac{1}{9} = 2\frac{2}{9}. \text{ Ans.}$$

(3)

$$\frac{1}{11} + \frac{6}{11} + \frac{11}{11} + \frac{9}{11} = 2\frac{7}{11}. \text{ Ans.}$$

(4)

$$\frac{12}{15} + \frac{17}{15} + \frac{18}{15} + \frac{7}{15} = 4\frac{1}{15}. \text{ A.}$$

(5)

$$\frac{2}{7} + \frac{2}{7} + \frac{5}{7} + \frac{19}{7} + \frac{11}{7} = 6\frac{5}{7}. \text{ A.}$$

(6)

$$\frac{5}{12} + \frac{4}{12} + \frac{3}{12} + \frac{1}{12} + \frac{29}{12} = 2\frac{3}{4}. \text{ A.}$$

(7)

$$\frac{1}{4} + \frac{2}{5} + \frac{9}{10} = 1\frac{11}{20}. \text{ Ans.}$$

(8)

$$\frac{2}{3} + \frac{4}{5} + \frac{5}{8} + \frac{7}{15} = 2\frac{23}{30}. \text{ Ans.}$$

(9)

$$\frac{3}{4} + \frac{2}{7} + \frac{5}{8} + \frac{9}{14} = 2\frac{17}{56}. \text{ Ans.}$$

(10)

$$\frac{5}{9} + \frac{7}{12} + \frac{5}{18} + \frac{21}{17} = 2\frac{123}{204}. \text{ Ans.}$$

(11)

$$\frac{7}{8} + \frac{7}{12} + \frac{13}{18} + \frac{11}{18} + \frac{19}{24} = 3\frac{27}{44}. \text{ A.}$$

(12)

$$\frac{3}{4} + \frac{5}{8} + \frac{9}{16} + \frac{5}{32} + \frac{15}{64} = 2\frac{21}{64}. \text{ A.}$$

(13)

$$\frac{1}{16} + \frac{3}{7} + \frac{2}{8} + \frac{4}{9} = 1\frac{187}{1008}. \text{ Ans.}$$

(14)

$$\frac{1}{5} + \frac{13}{15} + \frac{2}{5} = 4\frac{1}{15}. \text{ Ans.}$$

(15)

$$\frac{3}{17} + \frac{5}{12} + \frac{13}{4} + \frac{2}{3} = 4\frac{29}{33}. \text{ Ans.}$$

(16)

$$\frac{9}{17} + \frac{5}{12} + \frac{2}{3} + \frac{7}{8} = 2\frac{451}{2040}. \text{ Ans.}$$

(18)

$$\frac{1}{2} + \frac{1}{3} = \frac{5}{6}; \quad \frac{1}{2} + \frac{1}{5} = \frac{7}{10}; \quad \frac{1}{7} + \frac{1}{8} = \frac{15}{56}; \quad \frac{1}{9} + \frac{1}{10} = \frac{19}{90}. \text{ Ans.}$$

(19)

$$\frac{1}{12} + \frac{1}{16} = \frac{22}{240}; \quad \frac{1}{15} + \frac{1}{16} = \frac{31}{240}; \quad \frac{1}{6} + \frac{1}{8} = \frac{15}{24}; \quad \frac{1}{8} + \frac{1}{8} = \frac{13}{40}. \text{ Ans.}$$

(20)

$$\frac{63}{8} + \frac{35}{3} + \frac{110}{7} = 39\frac{103}{105}. \text{ Ans.}$$

( 21 )

$$1\frac{1}{2} + 3\frac{1}{7} + \frac{7}{2} = 9\frac{21}{14}. \text{ Ans.}$$

( 22 )

$$3\frac{2}{3} + 7\frac{4}{5} + \frac{1}{2} + 2\frac{1}{3} = 15\frac{37}{30}. \text{ Ans.}$$

( 23 )

$$2\frac{3}{5} + 4\frac{7}{8} + \frac{15}{10} = 11\frac{9}{40}. \text{ Ans.}$$

( 24 )

$$12\frac{3}{4} + 9\frac{2}{3} + \frac{2}{7} = 26\frac{11}{84}. \text{ Ans.}$$

( 25 )

$$\frac{9}{10} \text{ of } 6\frac{7}{8} + \frac{4}{7} \text{ of } 7\frac{1}{2} = \frac{99}{10} + \frac{30}{7} = 10\frac{53}{70}. \text{ Ans.}$$

( 26 )

$$\frac{1}{5} \text{ of } 9\frac{3}{8} + \frac{2}{3} \text{ of } 4\frac{5}{8} = \frac{75}{40} + \frac{74}{24} = 4\frac{23}{24}. \text{ Ans.}$$

( 27 )

$$\frac{3}{8} + \frac{36}{11} + \frac{5}{2} = 6\frac{41}{110}. \text{ Ans.}$$

( 28 )

$$\frac{35}{8} + \frac{93}{44} = 6\frac{43}{88}. \text{ Ans.}$$

( 29 )

$$3\frac{5}{7} + 4\frac{5}{8} + 16\frac{5}{11} = 24\frac{89}{88}. \text{ Ans.}$$

( 30 )

$$3\frac{5}{7} + 4\frac{5}{8} + 5\frac{1}{3} = 13\frac{113}{168}. \text{ Ans.}$$

( 31 )

$$6\frac{3}{4} + 13\frac{3}{7} + 18\frac{1}{8} + 132\frac{1}{8} = 170\frac{79}{88}. \text{ Ans.}$$

( 32 )

$$12\frac{5}{7} + 26\frac{8}{9} + 40\frac{13}{18} = 80\frac{41}{126}. \text{ Ans.}$$

( 33 )

$$\$2\frac{5}{8} + \$9\frac{5}{8} + \$5\frac{3}{4} = \$18\frac{5}{4}. \text{ Ans.}$$

( 34 )

$$35\frac{1}{3} + 28\frac{4}{7} + 25\frac{7}{21} = 89\frac{5}{21} \text{ miles. Ans.}$$

( 35 )

$$54\frac{3}{4} + 55\frac{3}{8} + 51\frac{7}{8} + 50\frac{3}{2} = 212\frac{7}{2} \text{ pounds. Ans.}$$

( 36 )

$$\frac{7}{12} + 3\frac{4}{9} + 7\frac{3}{4} + 5\frac{1}{6} = \$16\frac{1}{12}. \text{ Ans.}$$

( 37 )

$$22\frac{1}{8} + 20\frac{7}{8} + 21\frac{1}{2} = 65\frac{61}{80} \text{ pounds. } \textit{Ans.}$$

( 38 )

$$18\frac{7}{2} + 19\frac{11}{10} + 19\frac{5}{9} + 21\frac{11}{15} + 20\frac{13}{8} = 100\frac{13}{80} \text{ cwt. } \textit{Ans.}$$

( 39 )

$$17\frac{3}{8} + 25\frac{3}{8} + 46\frac{8}{15} = 89\frac{16}{15} \text{ acres. } \textit{Ans.}$$

( 40 )

$$112\frac{5}{7} + 9\frac{5}{2} + 225\frac{9}{14} = 347\frac{11}{2} \text{ bushels. } \textit{Ans.}$$

$$\$250\frac{1}{2} + \$62\frac{3}{8} + \$104\frac{7}{9} = \$417\frac{343}{80} \text{ } \textit{Ans.}$$

## ADDITION OF FRACTIONS.

( 1 )

$$\frac{2}{3} \text{ yd.} \times 3 \text{ ft.} \times 12 \text{ in.} = 2\frac{1}{2} \text{ in.} = 13\frac{1}{2} \text{ in.}; 13\frac{1}{2} \text{ in.} + \frac{5}{8} \text{ in.} = 14\frac{1}{8} \text{ in.}$$

( 2 )

$$\frac{1}{3} \text{ wk.} \times 7 \times 24 = 56 \text{ hr.}; \frac{1}{4} \text{ da.} \times 24 = 6 \text{ hr.}; \text{ then, } 56 \text{ hr.} + 6 \text{ hr.} + \frac{1}{2} \text{ hr.} = 62\frac{1}{2} \text{ hr.} = 2 \text{ da. } 14\frac{1}{2} \text{ hr. } \textit{Ans.}$$

( 3 )

$$\frac{3}{4} \text{ cwt.} = 3 \text{ qr.}; \frac{1}{2} \text{ lb.} = 21 \text{ lb.}; \frac{1}{2} \text{ cwt.} = 2 \text{ qr.}; 3 \text{ qr.} + 2 \text{ qr.} + 21 \text{ lb.} + 6 \text{ lb.} + 13 \text{ oz.} = 1 \text{ cwt. } 2 \text{ qr. } 2 \text{ lb. } 13 \text{ oz. } \textit{Ans.}$$

( 4 )

$$\frac{1}{8} \text{ lb. Troy} = 2 \text{ oz. } 8 \text{ pwt.}; \frac{1}{8} \text{ oz.} = 2 \text{ pwt. } 12 \text{ gr.}; 2 \text{ oz. } 8 \text{ pwt.} + 2 \text{ pwt. } 12 \text{ gr.} = 2 \text{ oz. } 10 \text{ pwt. } 12 \text{ gr. } \textit{Ans.}$$

( 5 )

$$\begin{array}{l} \frac{1}{3} \text{ of a ton.} = 8 \text{ cwt. } 3 \text{ qr. } 13 \text{ lb. } 14\frac{2}{3} \text{ oz.}; \\ \frac{1}{12} \text{ of a cwt.} = \frac{1 \text{ qr. } 16 \text{ lb. } 10\frac{2}{3} \text{ oz.}}{9 \text{ cwt. } 1 \text{ qr. } 5 \text{ lb. } 8\frac{5}{9} \text{ oz.}} \textit{Ans.} \end{array}$$

( 6 )

 $\frac{5}{9}$  of a *chal.* = 20 bushels ;
$$\frac{2}{7} \text{ of a bush.} = \frac{1 \text{ pk. } 5\frac{1}{2} \text{ qt.}}{20 \text{ bu. } 1 \text{ pk. } 5\frac{1}{2} \text{ qt.}} \text{ Ans.}$$

( 7 )

 $\frac{3}{4}$  of a tun = 3 hhd.
$$\frac{2}{3} \text{ of a hhd.} = \frac{37 \text{ gal. } 3 \text{ qt. } 0 \text{ pts. } 1\frac{1}{2} \text{ gi.}}{3 \text{ hhd. } 37 \text{ gal. } 3 \text{ qt. } 0 \text{ pts. } 1\frac{1}{2} \text{ gi.}} \text{ Ans.}$$

( 8 )

 $\frac{1}{2}$  of  $\frac{3}{4}$  of a common year = 54 da. 18 hr. $\frac{3}{8}$  of  $\frac{5}{6}$  of a day = 5 hr.
$$\frac{7}{6} \text{ of } \frac{2}{3} \text{ of } \frac{3}{8} \text{ of } 19\frac{1}{4} \text{ hr.} = \frac{3 \text{ hr. } 47 \text{ m. } 30 \text{ sec.}}{55 \text{ da. } 2 \text{ hr. } 47 \text{ m. } 30 \text{ sec.}} \text{ A.}$$

( 9 )

 $\frac{5}{8}$  of an acre = 2 R. 20 P. $\frac{2}{3}$  of 19 sq. ft. = 11 sq. ft. 57  $\frac{2}{3}$  sq. in.
$$\frac{2}{7} \text{ of a sq. in.} = \frac{\frac{2}{7} \text{ sq. in.}}{2 \text{ R. } 20 \text{ P. } 11 \text{ sq. ft. } 58\frac{1}{5} \text{ sq. in.}} \text{ Ans.}$$

( 10 )

 $\frac{1}{2}$  of a yard = 5  $\frac{1}{2}$  in. $\frac{1}{4}$  of a foot = 1  $\frac{1}{2}$  in. $\frac{1}{4}$  of an inch =  $\frac{1}{4}$  in.

7 inches. A.

( 11 )

 $\frac{2}{3}$  of a £ = 13s. 4 d. $\frac{2}{5}$  of a shilling = 6  $\frac{2}{5}$  d.13s. 10  $\frac{2}{5}$  d. A.

( 12 )

 $\frac{1}{4}$  of a week = 1 da. 18 hr. $\frac{1}{3}$  of a day = 8 hr. $\frac{1}{2}$  of an hour = 30 m. $\frac{2}{4}$  of a minute = 45 sec.

2 da. 2 hr. 30 m. 45 sec. Ans.

( 13 )

$$\begin{array}{rcl}
 \frac{1}{8} \text{ of a mile} & = & 7 \text{ fur.} \\
 \frac{2}{3} \text{ of a yard} & = & 2 \text{ ft.} \\
 \frac{3}{4} \text{ of a foot} & = & 9 \text{ in.} \\
 \hline
 & & 7 \text{ fur. } 2 \text{ ft. } 9 \text{ in. } \text{ Ans.}
 \end{array}$$

( 14 )

$$\begin{array}{rcl}
 \frac{2}{5} \text{ of a leap year} & = & 219 \text{ da. } 14 \text{ hr. } 24 \text{ m.} \\
 \frac{1}{3} \text{ of a week} & = & 2 \text{ da. } 8 \text{ hr.} \\
 \frac{1}{8} \text{ of a day} & = & 3 \text{ hr.} \\
 \hline
 & & 222 \text{ da. } 1 \text{ hr. } 24 \text{ m. } \text{ Ans.}
 \end{array}$$

( 15 )

$$\begin{array}{rcl}
 \frac{4}{7} \text{ of a ton} & = & 11 \text{ cwt. } 1 \text{ qr. } 17 \text{ lb. } 13 \text{ oz. } 11 \frac{3}{7} \text{ dr.} \\
 \frac{5}{8} \text{ of a cwt.} & = & 3 \text{ qr. } 8 \text{ lb. } 5 \text{ oz. } 5 \frac{1}{8} \text{ dr.} \\
 \hline
 & & 12 \text{ cwt. } 1 \text{ qr. } 1 \text{ lb. } 3 \text{ oz. } 0 \frac{19}{8} \text{ dr.}
 \end{array}$$

( 16 )

$$\begin{array}{rcl}
 \frac{2}{3} \text{ of a pound Troy} & = & 7 \text{ oz. } 4 \text{ pwt.} \\
 \frac{1}{4} \text{ of an ounce} & = & 3 \text{ pwt. } 8 \text{ gr.} \\
 \frac{2}{5} \text{ of a pennyweight} & = & 15 \text{ gr.} \\
 \hline
 & & 7 \text{ oz. } 7 \text{ pwt. } 23 \text{ gr. } \text{ Ans.}
 \end{array}$$

( 17 )

$$\begin{array}{rcl}
 \frac{3}{19} \text{ of a Circle} & = & 1 \text{ sign } 26^{\circ} 50' 31 \frac{11}{19}'' \\
 3 \frac{5}{8} \text{ signs} & = & 3 \text{ signs } 18^{\circ} 45' \\
 \frac{2}{3} \text{ of a degree} & = & 40' \\
 \frac{2}{5} \text{ of } 5 \frac{1}{2} \text{ minutes} & = & 1' 8 \frac{1}{5}'' \\
 \hline
 & & 5 \text{ signs } 16^{\circ} 16' 40 \frac{29}{13}'' \text{ Ans.}
 \end{array}$$

( 18 )

$$\begin{array}{rcl}
 \frac{7}{8} \text{ of a yard} & = & 3 \text{ qr. } 2 \text{ na.} \\
 \frac{2}{3} \text{ of } \frac{5}{8} \text{ of a quarter} & = & 1 \frac{1}{2} \text{ na.} \\
 3 \frac{1}{2} \text{ nails} & = & 3 \frac{1}{2} \text{ na.} \\
 \hline
 & & 1 \text{ yd. } 0 \text{ qr. } 2 \frac{5}{8} \text{ na. } \text{ Ans.}
 \end{array}$$



( 19 )

$$\begin{array}{rcl}
 \frac{3}{16} \text{ of a cord} & = & 1 \text{ cord ft. } 8 \text{ cubic ft.} \\
 \frac{5}{8} \text{ of a cu. foot} & = & 960 \text{ c. in.} \\
 \frac{2}{3} \text{ of } \frac{1}{2} \text{ of } 24\frac{3}{7} \text{ c. feet} & = & 2 \text{ cubic ft. } 1234\frac{1}{2} \text{ c. in.} \\
 & \hline & 1 \text{ cord ft. } 11 \text{ cubic ft. } 466\frac{2}{3} \text{ c. in.} \quad \text{A.}
 \end{array}$$

( 20 )

$$\begin{array}{rcl}
 \frac{3}{4} \text{ of } \frac{1}{2} \text{ of } 4 \text{ cords} & = & 1 \text{ cord } 4 \text{ cord ft.} \\
 \frac{5}{8} \text{ of } \frac{1}{16} \text{ of } 15 \text{ cord ft.} & = & 7 \text{ cord ft. } 00 \text{ c. ft. } 864 \text{ c. in.} \\
 \frac{2}{3} \text{ of } 31\frac{1}{2} \text{ c. ft.} & = & 1 \text{ c. ft. } 864 \text{ c. in.} \\
 & \hline & 2 \text{ cords } 4 \text{ cord ft. } 2 \text{ c. ft.} \quad \text{Ans.}
 \end{array}$$

( 21 )

$$\begin{array}{rcl}
 \frac{5}{8} \text{ of } 3 \text{ E. E.} & = & 3 \text{ yd. } 0 \text{ qr. } 2 \text{ na.} \\
 \frac{5}{12} \text{ of a yard} & = & 1 \text{ qr. } 2\frac{2}{3} \text{ na.} \\
 & \hline & 3 \text{ yd. } 2 \text{ qr. } 0\frac{2}{3} \text{ na.} \quad \text{Ans.}
 \end{array}$$

( 22 )

$$\begin{array}{rcl}
 \frac{4}{5} \text{ of } 3 \text{ A. } 1 \text{ R. } 20 \text{ P.} & = & 2 \text{ A. } 2 \text{ R. } 32 \text{ P.} \\
 \frac{3}{8} \text{ of an acre} & = & 1 \text{ R. } 20 \text{ P.} \\
 \frac{3}{4} \text{ of } 3 \text{ R. } 15 \text{ P.} & = & 2 \text{ R. } 21\frac{1}{4} \text{ P.} \\
 & \hline & 3 \text{ A. } 2 \text{ R. } 33\frac{1}{4} \text{ P.} \quad \text{Ans.}
 \end{array}$$

( 23 )

$$\begin{array}{rcl}
 \frac{1}{12} \text{ of a ton} & = & 11 \text{ cwt. } 2 \text{ qr. } 16 \text{ lb. } 10 \text{ oz. } 10\frac{1}{2} \text{ dr.} \\
 \frac{3}{10} \text{ of a cwt.} & = & 1 \text{ qr. } 5 \text{ lb.} \\
 \frac{5}{12} \text{ of an ounce} & = & 6\frac{2}{3} \text{ dr.} \\
 & \hline & 11 \text{ cwt. } 3 \text{ qr. } 21 \text{ lb. } 11 \text{ oz. } 1\frac{1}{3} \text{ dr.} \quad \text{Ans.}
 \end{array}$$

( 24 )

$$\begin{array}{rcl}
 \frac{1}{2} \text{ of } \frac{3}{4} \text{ of a mile} & = & 2 \text{ fur. } 16 \text{ rd.} \\
 \frac{3}{8} \text{ of a furlong} & = & 24 \text{ rd.} \\
 \frac{4}{33} \text{ of a rod} & = & 2 \text{ ft.} \\
 \frac{1}{2} \text{ of a foot} & = & 6 \text{ in.} \\
 & \hline & 3 \text{ fur. } 00 \text{ rd. } 2 \text{ ft. } 6 \text{ in.} \quad \text{Ans.}
 \end{array}$$

$$\begin{array}{rcl}
 & (25) & \\
 \frac{1}{25} \text{ of a common year} & = & 2wk. 2da. 14hr. 24m. \\
 \frac{5}{12} \text{ of a week} & = & 2da. 22hr. \\
 \frac{7}{9} \text{ of a day} & = & 18hr. 40m. \\
 \frac{3}{4} \text{ of an hour} & = & 45m. \\
 & & \hline
 & & 2wk. 6da. 7hr. 49m.
 \end{array}$$

## SUBTRACTION OF FRACTIONS.

$$\begin{array}{lll}
 (1) & (2) & (3) \\
 \frac{2}{7} - \frac{1}{7} = \frac{1}{7}. \text{ Ans.} & \frac{1}{9} - \frac{1}{9} = \frac{0}{9}. \text{ Ans.} & \frac{1}{25} - \frac{1}{25} = \frac{0}{25}. \text{ Ans.}
 \end{array}$$

$$\begin{array}{ll}
 (4) & (5) \\
 \frac{301}{100} - \frac{101}{100} = \frac{200}{100}. \text{ Ans.} & \frac{9}{7} - \frac{4}{7} = \frac{5}{7}. \text{ Ans.}
 \end{array}$$

$$\begin{array}{ll}
 (6) & (7) \\
 \frac{11}{12} - \frac{1}{6} = \frac{5}{12}. \text{ Ans.} & \frac{1}{2} - \frac{1}{3} = \frac{1}{6}. \text{ Ans.}
 \end{array}$$

$$(8) \\
 37\frac{11}{16} - \frac{1}{2} \text{ of } 5\frac{5}{8} = \frac{596}{16} - \frac{25}{16} = \frac{571}{16} = 35\frac{11}{16}. \text{ Ans.}$$

$$\begin{array}{ll}
 (9) & (10) \\
 \frac{3}{4} - \frac{5}{9} = \frac{7}{36}. \text{ Ans.} & \frac{7}{8} - \frac{5}{18} = \frac{13}{72}. \text{ Ans.}
 \end{array}$$

$$\begin{array}{ll}
 (11) & (12) \\
 25 - \frac{11}{2} = 24\frac{1}{2}. \text{ A.} & \frac{6}{15} \text{ of } 3 - \frac{1}{3} \text{ of } \frac{4}{9} = \frac{6}{9} - \frac{4}{27} = \frac{14}{27} = 1\frac{1}{27}. \text{ A.}
 \end{array}$$

$$(13) \\
 \frac{1}{7} \text{ of } \frac{3}{8} \text{ of } 7 = \frac{1}{2}; \frac{1}{2} - \frac{3}{8} = \frac{1}{8}. \text{ Ans.}$$

$$(14) \\
 3\frac{5}{8} - \frac{1}{2} \text{ of } \frac{7}{8} = \frac{29}{8} - \frac{7}{8} = 3\frac{1}{2}. \text{ Ans.}$$

$$(15) \\
 \frac{2}{3} \text{ of } 15 - \frac{1}{3} \text{ of } 3 = \frac{10}{1} - \frac{1}{1} = 9. \text{ Ans.}$$

( 16 )

$$7\frac{1}{2} \text{ of } 2 - \frac{1}{2} \text{ of } \frac{2}{3} = \frac{44}{3} - \frac{2}{30} = 14\frac{2}{3}. \text{ Ans}$$

( 17 )

$$\frac{4}{5} - \frac{2}{3} = \frac{1}{15}. \text{ Ans.}$$

( 18 )

$$5 - 1\frac{7}{9} = 3\frac{2}{9}. \text{ Ans.}$$

( 19 )

$$17\frac{2}{5} - 7\frac{2}{3} = 9\frac{1}{15}. \text{ A.}$$

( 20 )

$$3\frac{4}{5} + 10\frac{4}{5} = 14\frac{17}{10}; 25\frac{1}{4} - 17\frac{1}{10} = 7\frac{1}{10}; 14\frac{17}{10} - 7\frac{1}{10} = 6\frac{2}{10}. \text{ Ans.}$$

( 21 )

$$9 - \frac{21}{10} = 8\frac{9}{10}; 8\frac{9}{10} + \frac{2}{3} = 8\frac{7}{3}. \text{ Ans.}$$

( 22 )

$$\frac{2}{3} \text{ of } \frac{4}{5} = \frac{8}{15}; \frac{1}{2} \text{ of } \frac{5}{6} = \frac{5}{12}; \frac{5}{12} \text{ of } \frac{8}{15} = \frac{2}{3} \text{ of the whole vessel sold;}$$

$$\frac{8}{15} - \frac{2}{3} = \frac{1}{15} \text{ the part left.}$$

( 23 )

$$\frac{1}{2} \text{ of } \frac{4}{5} \text{ of } \frac{9}{16} \text{ of } \frac{590}{1} = \$120; \frac{2}{7} \text{ of } \frac{1}{2} \text{ of } \frac{2}{3} \text{ of } \frac{1680}{1} = \$192;$$

$$192 - 120 = \$72. \text{ Ans.}$$

( 24 )

$$2\frac{1}{4} - 1\frac{7}{8} = \$\frac{3}{8}. \text{ Ans.}$$

( 25 )

$$31\frac{1}{2} - 12\frac{5}{7} = 18\frac{11}{14} \text{ gals. Ans.}$$

( 26 )

$$10\frac{2}{3} + 24\frac{5}{6} = 35\frac{1}{2} \text{ cords; } 35\frac{1}{2} - 16\frac{7}{9} = 18\frac{1}{3} \text{ cords. Ans.}$$

( 27 )

$$54\frac{9}{10} + 56\frac{11}{12} = 111\frac{49}{60}; 43\frac{1}{2} + 34\frac{4}{5} = 78\frac{2}{5}; 111\frac{49}{60} - 78\frac{2}{5}$$

$$= 33\frac{3}{20} \text{ pounds. Ans.}$$

( 28 )

$$15\frac{7}{8} + 12\frac{7}{8} = 28\frac{5}{8}; 60\frac{1}{2} - 28\frac{5}{8} = \$22\frac{3}{16}. \text{ Ans.}$$

( 29 )

$$\frac{1}{2} + \frac{1}{4} = \frac{3}{4}; \frac{3}{4} - \frac{9}{20} = \frac{3}{10}. \text{ Ans.}$$

( 30 )

$$27\frac{4}{9} + 32\frac{1}{6} = 59\frac{11}{18}; \quad 59\frac{11}{18} - 40\frac{1}{6} = 18\frac{2}{3} \text{ yards. } \textit{Ans.}$$

( 1 )

$$14\frac{4}{7} - 12\frac{6}{9} = 2\frac{34}{33}. \textit{Ans.}$$

( 2 )

$$115\frac{3}{8} - 39\frac{7}{8} = 76\frac{1}{8}. \textit{Ans.}$$

( 3 )

$$78\frac{3}{6} - 4\frac{7}{3} = 73\frac{2}{3}. \textit{Ans.}$$

( 4 )

$$48\frac{5}{9} - 41\frac{5}{8} = 6\frac{32}{72}. \textit{Ans}$$

( 5 )

$$287\frac{5}{25} - 104\frac{37}{100} = 182\frac{83}{100}. \textit{Ans.}$$

( 1 )

$$\frac{5}{6} \text{ of a pound} = 10\text{oz. } 00\text{pwt. } 00\text{gr.}$$

$$\frac{5}{8} \text{ of an ounce} = \frac{12\text{pwt. } 12\text{gr.}}{9\text{oz. } 7\text{pwt. } 12\text{gr.}} \textit{Ans.}$$

( 2 )

$$\frac{3}{8} \text{ of a ton} = 7\text{cwt. } 2\text{qr. } 00\text{lb. } 0\text{oz.}$$

$$\frac{2}{3} \text{ of } \frac{3}{4} = \frac{1}{2}\text{lb.} = \frac{8\text{oz.}}{7\text{cwt. } 1\text{qr. } 24\text{lb. } 8\text{oz.}} \textit{Ans.}$$

( 3 )

$$\frac{2}{3} \text{ of } \frac{5}{7} \text{ of a hhd.} = \frac{10}{21}\text{hhd.} = 30\text{gal.}$$

$$\frac{3}{4} \text{ of } \frac{1}{2} \text{ of a qt.} = \frac{\frac{3}{8}\text{qt.}}{20\text{gal. } 3\frac{1}{8}\text{qt.}} \textit{Ans.}$$

( 4 )

$$\frac{3}{8} \text{ of a } L. = 1\text{m. } 6\text{fur. } 16\text{rd.}$$

$$\frac{5}{8} \text{ of a mile} = \frac{5\text{fur.}}{1\text{m. } 1\text{fur. } 16\text{rd.}} \textit{Ans.}$$

( 5 )

$$1\frac{1}{2} \text{ shillings} = 1\text{s. } 8\text{d.}$$

$$\frac{2}{3} \text{ of } 7\frac{1}{2}\text{d.} = \frac{5\text{d.}}{1\text{s. } 3\text{d.}} \textit{Ans.}$$

( 6 )

$$2\frac{1}{8} \text{ of a degree} = 45'$$

$$\frac{2}{3} \text{ of } \frac{1}{4} \text{ of a deg.} = 6' 25\frac{5}{4}'' = 38' 34\frac{3}{4}'' \textit{A.}$$

( 7 )

$$\begin{array}{rcl}
 \frac{1}{8} \text{ of a square mile} & = & 600 A. \\
 36\frac{7}{8} \text{ acres} & = & 36 A. \quad 3 R. \quad 4\frac{1}{8} P. \\
 & & \hline
 & & 563 A. \quad 0 R. \quad 35\frac{1}{8} P. \quad \text{Ans.}
 \end{array}$$

( 8 )

$$\begin{array}{rcl}
 \frac{3}{4} \text{ of a ton} & = & 17 \text{ cwt. } 0 \text{ qr. } 14 \text{ lb. } 2\frac{3}{4} \text{ oz.} \\
 \frac{5}{8} \text{ of } 12 \text{ cwt.} & = & 6 \text{ cwt. } 2 \text{ qr. } 16 \text{ lb. } 10\frac{3}{4} \text{ oz.} \\
 & & \hline
 & & 10 \text{ cwt. } 1 \text{ qr. } 22 \text{ lb. } 9\frac{1}{2} \text{ oz.} \quad \text{Ans.}
 \end{array}$$

( 9 )

$$\begin{array}{rcl}
 1\frac{1}{4} \text{ pound Troy} & = & 1 \text{ lb. } 9 \text{ oz. } 0 \text{ pwt. } 0 \text{ gr.} \\
 \frac{1}{8} \text{ of an ounce} & = & 3 \text{ pwt. } 8 \text{ gr.} \\
 & & \hline
 & & 1 \text{ lb. } 8 \text{ oz. } 16 \text{ pwt. } 16 \text{ gr.} \quad \text{Ans.}
 \end{array}$$

( 10 )

$$\begin{array}{rcl}
 2\frac{3}{4} \text{ cords} & = & 2 \text{ cords } 3 \text{ cord ft. } 0 \text{ c. ft.} \\
 \frac{3}{4} \text{ of a cord ft.} & = & 12 \text{ c. ft.} \\
 & & \hline
 & & 2 \text{ cords } 2 \text{ cord ft. } 4 \text{ c. ft.} \quad \text{Ans.}
 \end{array}$$

( 11 )

$$\begin{array}{rcl}
 \frac{1}{8} \text{ of a yard} & = & 6 \text{ in.} \\
 \frac{2}{3} \text{ of an inch} & = & \frac{2}{3} \text{ in.} \\
 & & \hline
 & & 5\frac{1}{3} \text{ in.} \quad \text{Ans.}
 \end{array}$$

( 12 )

$$\begin{array}{rcl}
 \frac{1}{2} \text{ of } \frac{3}{4} \text{ of a £} & = & 4 \text{ £ } 4 \text{ s } 0 \text{ d } 0 \text{ gr.} \\
 \frac{1}{2} \text{ of } \frac{1}{2} \text{ of a } 3 & = & 16 \text{ gr.} \\
 & & \hline
 & & 4 \text{ £ } 3 \text{ s } 2 \text{ d } 4 \text{ gr.} \quad \text{Ans.}
 \end{array}$$

( 13 )

$$\begin{array}{l}
 1 \text{ ounce avoirdupois} = 437\frac{1}{2} \text{ Troy grains ; } 1 \text{ ounce Troy} = 480 \\
 \text{grains ; } 480 - 437\frac{1}{2} \text{ Troy grains} = 1 \text{ pwt. } 18\frac{1}{2} \text{ grains.} \quad \text{Ans.}
 \end{array}$$

## MULTIPLICATION OF FRACTIONS.

$$\begin{array}{lll} (1) & (2) & (3) \\ \frac{3}{7} \times 8 = 3\frac{3}{7}. & \text{Ans.} & \frac{9}{75} \times 12 = 1\frac{7}{5}. \text{ Ans.} & \frac{32}{40} \times 9 = 7\frac{1}{2}. \text{ A.} \end{array}$$

$$\begin{array}{ll} (4) & (5) \\ \frac{14}{15} \times 15 = 11\frac{1}{15}. & \text{Ans.} & \frac{75}{8} \times 12 = 9\frac{3}{8}. \text{ Ans.} \end{array}$$

$$\begin{array}{ll} (6) & (7) \\ \frac{4}{5} \text{ of } \frac{4}{7} \times 35 = 16. & \text{Ans.} & 3\frac{1}{2} \text{ of } \frac{2}{3} \times 14 = 32\frac{2}{3}. \text{ Ans.} \end{array}$$

$$\begin{array}{ll} (8) & (9) \\ 1\frac{3}{4} \text{ of } 2\frac{1}{2} \times 16 = 70. & \text{Ans.} & 2\frac{1}{2} \text{ of } \frac{2}{7} \times 70 = 44. \text{ Ans.} \end{array}$$

$$\begin{array}{ll} (10) & (12) \\ 4\frac{2}{5} \text{ of } \frac{3}{7} \times 36 = 158\frac{4}{5}. & \text{Ans.} & 67 \times 9\frac{1}{12} = 608\frac{7}{12}. \text{ Ans.} \end{array}$$

$$\begin{array}{ll} (13) & (14) \\ 842 \times 7\frac{1}{3} = 5987\frac{2}{3}. & \text{Ans.} & 360 \times 12\frac{2}{3} = 4536. \text{ Ans.} \end{array}$$

$$\begin{array}{ll} (15) & (16) \\ 460 \times 11\frac{3}{4} = 5405. & \text{Ans.} & 620 \times 10\frac{3}{4} = 6975. \text{ Ans.} \end{array}$$

$$(17) \\ 1340 \times 8\frac{3}{4} = 11725. \text{ Ans.}$$

$$\begin{array}{ll} (1) & (2) \\ \frac{4}{5} \times 8 = 3\frac{1}{5}. & \text{Ans.} & 15 \times \frac{6}{7} = 12\frac{6}{7}. \text{ Ans.} \end{array}$$

$$\begin{array}{ll} (3) & (4) \\ 11 \times \frac{9}{75} = 5\frac{13}{15}. & \text{Ans.} & 7\frac{7}{8} \times 8 = 63. \text{ Ans.} \end{array}$$

$$\begin{array}{ll} (5) & (6) \\ 9\frac{1}{2} \times 18\frac{3}{4} = 178\frac{1}{8}. & \text{Ans.} & 3\frac{2}{7} \times 4\frac{1}{3} = 14\frac{1}{3}\frac{2}{3}. \text{ Ans.} \end{array}$$

$$\begin{array}{ll} (7) & (8) \\ \frac{17}{81} \times 9 = 19\frac{2}{9}. & \text{Ans.} \quad \frac{2}{4} \times \frac{2}{5} = \frac{2}{10}. \quad \text{Ans.} \end{array}$$

$$\begin{array}{ll} (9) & (10) \\ \frac{1}{8} \times \frac{2}{5} = \frac{2}{40}. & \text{Ans.} \quad \frac{1}{4} \text{ of } \frac{2}{8} \times \frac{5}{9} = \frac{5}{36}. \quad \text{Ans.} \end{array}$$

$$\begin{array}{ll} (11) & (12) \\ \frac{5}{12} \times \frac{2}{10} \text{ of } \frac{6}{27} = \frac{1}{12}. & \text{Ans.} \quad \frac{1}{2} \text{ of } \frac{7}{8} \times \frac{1}{4} \text{ of } \frac{6}{10} = \frac{3}{20}. \quad \text{Ans.} \end{array}$$

$$\begin{array}{ll} (13) & (14) \\ \frac{7}{8} \times 16 = 14. & \text{Ans.} \quad \frac{2}{1} \times \frac{9}{7} = 18. \quad \text{Ans.} \end{array}$$

$$(15) \quad \frac{3}{2} \times 18 = 15\frac{3}{2}. \quad \text{Ans.}$$

$$\begin{array}{ll} (16) & (17) \\ 8\frac{7}{10} \times 15 = 130\frac{1}{2}. & \text{Ans.} \quad \frac{6}{11} \text{ of } \frac{2}{3} \times \frac{10}{14} = \frac{10}{11}. \quad \text{Ans.} \end{array}$$

$$\begin{array}{ll} (18) & (19) \\ 5\frac{1}{2} \times \frac{1}{2} \text{ of } 3\frac{1}{2} = 14. & \text{Ans.} \quad 842\frac{1}{2} \times 7\frac{1}{2} = 6316\frac{1}{2}. \quad \text{Ans.} \end{array}$$

$$\begin{array}{lll} (20) & (21) & (22) \\ \frac{5}{9} \times \frac{6}{7} = \frac{10}{11}. & \text{A.} \quad \frac{9}{10} \times 7\frac{7}{11} = 6\frac{4}{11}. & \text{A.} \quad \frac{1}{2} \times \frac{2}{3} \text{ of } \frac{7}{15} = \frac{1}{15}. & \text{A.} \end{array}$$

$$\begin{array}{lll} (23) & (24) & (25) \\ \begin{array}{r|l} 11 & 72 \\ 7 \overline{) 23} & 222 \\ 40 & 40 \\ \hline 7 & 4 = \frac{1}{4}. \end{array} & \begin{array}{r|l} 3 \overline{) 27} & 14 \\ 20 & 0 \\ 5 \overline{) 13} & 0 \\ 30 & 20 \\ \hline 15 & 1 = \frac{1}{15}. \end{array} & \begin{array}{r|l} 3 \overline{) 17} & 12^4 \\ 0 & 2 \\ 1 & 17 \\ \hline 3 & 8 = 2\frac{2}{3}. \end{array} \end{array}$$

$$\begin{array}{lll} (26) & (27) & (28) \\ \begin{array}{r|l} 1 & 02 \\ 3 & 2 \\ 1 & 5 \\ \hline 1 & 20 = 20. \end{array} & \begin{array}{r|l} 8 & 1 \\ 0 & 1 \\ 1 & 3 \\ 7 & 106 \\ \hline 56 & 53 = \frac{53}{56}. \end{array} & \begin{array}{r|l} 3 \overline{) 0} & 2 \\ 4 & 3 \\ 0 & 5 \\ 7 & 23 \\ \hline 84 & 23 = \frac{23}{84}. \end{array} \end{array}$$

$\begin{array}{r l} (29) & \\ 1 & 5 \\ 3 & 2 \\ 7 & 2 \\ \cancel{5} & 3 \\ \cancel{5} & 25 \\ \hline 21 & 50 = 2\frac{8}{21}. \text{ Ans.} \end{array}$	$\begin{array}{r l} (30) & \\ 1 & 14 \\ \cancel{5} & 5 \\ \cancel{5} & 43 \\ 1 & 5 \\ \cancel{7} & 45 \\ \hline 1 & 540 = 540. \text{ Ans.} \end{array}$	$\begin{array}{r l} (31) & \\ 4 & 3 \\ & 7 \\ \hline 4 & 21 = 5\frac{1}{4}. \end{array}$
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$\begin{array}{r l} (32) & 2 \\ 7 & 5 \\ \cancel{4} & 51 \\ \hline 7 & 102 = \$14\frac{1}{2}. \text{ A.} \end{array}$	$\begin{array}{r l} 3(33) & 2 \\ \cancel{5} & 14 \\ \cancel{5} & 3 \\ \hline 3 & 2 = \$\frac{2}{3}. \text{ A.} \end{array}$	$\begin{array}{r l} 4(34) & \\ \cancel{5} & 5 \\ 1 & 9 \\ \hline 4 & 45 = 11\frac{1}{4} \text{ ton.} \end{array}$
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$\begin{array}{r l} 2(35) & \\ \cancel{15} & 15 \\ 1 & 24 \\ \hline 2 & 45 = \$22\frac{1}{2}. \text{ A.} \end{array}$	$\begin{array}{r l} (36) & \\ 8 & 7 \\ 2 & 7 \\ \hline 16 & 49 = \$3\frac{1}{8}. \text{ A.} \end{array}$	$\begin{array}{r l} (37) & 4 \\ 3 & 1 \\ \cancel{12} & 11 \\ \hline 3 & 44 = \$14\frac{1}{2}. \end{array}$
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$\begin{array}{r l} (38) & \\ 4 & 5 \\ 8 & 49 \\ \hline 32 & 245 = \$7\frac{1}{2}. \text{ A.} \end{array}$	$\begin{array}{r l} (39) & \\ 2 & 5 \\ 8 & 27 \\ \hline 16 & 135 = \$8\frac{1}{8}. \text{ A.} \end{array}$	$\begin{array}{r l} (40) & 5 \\ \cancel{15} & 7 \\ & 11 \\ \hline & 55 \text{ cts. Ans.} \end{array}$
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$\begin{array}{r l} 3(41) & 103 \\ \cancel{15} & 11 \\ \cancel{11} & 5 \\ \hline 3 & 103 = \$34\frac{1}{3}. \text{ A.} \end{array}$	$\begin{array}{r l} (42) & 4 \\ 1 & 5 \\ \cancel{14} & 9 \\ \hline & 36 = \$36. \text{ A.} \end{array}$	$\begin{array}{r l} (43) & \\ 2 & 35 \\ 2 & 5 \\ \hline 4 & 175 = 43\frac{3}{4} \text{ s.} \end{array}$
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$\begin{array}{r l} (44) & 13 \\ \cancel{5} & 10 \\ \cancel{5} & 25 \\ \hline & \$325. \text{ Ans.} \end{array}$	$\begin{array}{r l} 3(45) & \\ \cancel{5} & 5 \\ 3 & 2 \\ \hline 9 & 5 = \$\frac{5}{9}. \text{ Ans.} \end{array}$	$\begin{array}{r l} 5(46) & \\ 2 & 15 \\ \cancel{14} & 7 \\ & 3 \\ \hline 10 & 3 = \frac{3}{10}. \text{ A.} \end{array}$
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$$\begin{array}{r|l} 2(47) & 3 \\ \cancel{10} & 5 \\ 4 & 5 \\ \hline 8 & 3 = \$\frac{3}{8}. \text{ Ans.} \end{array}$$

$$\begin{array}{r|l} (48) & \\ 3 & 2 \\ 12 & 11 \\ 2 & 4 \\ \cancel{10} & 15 \\ \hline 24 & 11 = \$\frac{11}{24}. \text{ Ans.} \end{array}$$



$$\begin{array}{r|l} (49) & 13 \\ \hline 4 & 3\phi \\ 3 & 24 \\ 5 & 1\phi \\ \hline 5 & 104 = \$20\frac{1}{2}. \text{ Ans.} \end{array}$$

$$\begin{array}{r|l} (50) & 5 \\ \hline 2 & 4\phi \\ \phi & 5 \\ \hline 2 & 25 = 12\frac{1}{2} \text{ days. A.} \end{array}$$

$$\begin{array}{r|l} (51) & \\ \hline 2\phi & 1.16 \\ 3 & 32\phi \\ \hline 3 & 16 = 5\frac{1}{3} \text{ hours. Ans.} \end{array}$$

$$\begin{array}{r|l} (52) & 2 \\ \hline 5 & 1\phi \\ \phi & 167 \\ \hline 5 & 334 = \$66\frac{1}{2}. \text{ Ans.} \end{array}$$

$$\begin{array}{r|l} (53) & \\ \hline 2 & 734 \\ 7 & \phi\phi \\ \hline & 34 \text{ miles. Ans.} \end{array}$$

$$\begin{array}{r|l} (54) & 25 \\ \hline 4 & 12\phi \\ \phi & 73 \\ \hline 4 & 1825 = 456\frac{1}{4} \text{ cents.} \end{array}$$

$$\begin{array}{r|l} (55) & 25 \\ \hline 24 & 7\phi \\ \phi & 73 \\ \hline 8 & 1825 = 228\frac{1}{4} \text{ cents. Ans.} \end{array}$$

$$\begin{array}{r|l} (56) & \\ \hline 8 & 5 \\ 3 & 307 \\ \hline 24 & 1535 = \$63\frac{3}{4}. \end{array}$$

$$\begin{array}{r|l} (57) & \\ \hline 16 & 289 \\ 5 & 3 \\ \hline 80 & 867 = \$10\frac{6}{7}. \text{ A.} \end{array}$$

$$\begin{array}{r|l} (58) & 3000 \\ \hline \phi & 1\phi\phi\phi\phi \\ & 4 \\ \hline & \$12000. \text{ A.} \end{array}$$

$$\begin{array}{r|l} (59) & \\ \hline 7 & 3 \\ 5 & 3 \\ \hline 35 & 9 = \frac{9}{35} \text{ A's.} \\ \frac{3}{7} - \frac{9}{35} & = \frac{6}{35} \text{ B's.} \end{array}$$

$$\begin{array}{r|l} (60) & \\ \hline \phi & 7 \\ 3\phi & A \\ \phi & \phi \\ 7 & \phi \\ \hline 3 & 1 = \frac{1}{3} \text{ D's share.} \end{array}$$

$$\begin{array}{r|l} (61) & 40 \\ \hline \phi & 2\phi\phi \\ & 3 \\ \hline & 120 \text{ acres A's.} \\ 3 & 2 \\ \hline 3 & 240 = 80 \text{ acres B's.} \\ 4 & 1 \\ \hline 12 & 240 = 20 \text{ acres C's.} \end{array}$$

## DIVISION OF FRACTIONS.

$$\begin{array}{r} 5 \quad (1) \\ 18 \overline{) 21} \\ \underline{17} \phantom{0} \\ 4 \phantom{0} \end{array} \quad \begin{array}{r} 21 \\ 1 \end{array}$$

$$5 \overline{) 1} = 1\frac{1}{5}. \text{ Ans.}$$

$$\begin{array}{r} (2) \\ 2 \quad 14 \overline{) 3} \\ \underline{28} \phantom{0} \\ 6 \phantom{0} \end{array} \quad \begin{array}{r} 3 \\ 1 \end{array}$$

$$28 \overline{) 3} = 3\frac{3}{28}. \text{ Ans.}$$

$$\begin{array}{r} (3) \\ 15 \overline{) 13} \\ \underline{9} \phantom{0} \\ 4 \phantom{0} \end{array} \quad \begin{array}{r} 13 \\ 1 \end{array}$$

$$135 \overline{) 13} = 1\frac{3}{135}. \text{ Ans.}$$

$$\begin{array}{r} (4) \\ 319 \overline{) 120} \\ \underline{40} \phantom{0} \\ 80 \phantom{0} \end{array} \quad \begin{array}{r} 3 \\ 1 \end{array}$$

$$319 \overline{) 3} = 3\frac{3}{319}. \text{ Ans.}$$

$$\begin{array}{r} (5) \\ 64 \overline{) 23} \\ \underline{13} \phantom{0} \\ 10 \phantom{0} \end{array} \quad \begin{array}{r} 23 \\ 1 \end{array}$$

$$832 \overline{) 23} = 2\frac{3}{832}. \text{ Ans.}$$

$$\begin{array}{r} (6) \\ 1 \overline{) 5} \\ \underline{7} \phantom{0} \\ 10 \phantom{0} \end{array} \quad \begin{array}{r} 5 \\ 10 \end{array}$$

$$7 \overline{) 50} = 7\frac{1}{7}. \text{ Ans.}$$

$$\begin{array}{r} (7) \\ 1 \overline{) 27} \\ \underline{27} \\ 0 \end{array} \quad \begin{array}{r} 9 \\ 4 \end{array}$$

$$36 \overline{) 36} = 36. \text{ Ans.}$$

$$\begin{array}{r} (8) \\ 8 \overline{) 1} \\ \underline{1} \\ 7 \end{array} \quad \begin{array}{r} 1 \\ 7 \end{array}$$

$$8 \overline{) 7} = 7\frac{7}{8}. \text{ Ans.}$$

$$\begin{array}{r} 5 \quad (9) \\ 18 \overline{) 3} \\ \underline{18} \phantom{0} \\ 0 \phantom{0} \end{array} \quad \begin{array}{r} 3 \\ 4 \end{array}$$

$$5 \overline{) 12} = 2\frac{2}{5}. \text{ Ans.}$$

$$\begin{array}{r} 40 \quad (10) \\ 80 \overline{) 45} \\ \underline{80} \phantom{0} \\ 65 \phantom{0} \end{array} \quad \begin{array}{r} 9 \\ 7 \end{array}$$

$$40 \overline{) 63} = 1\frac{23}{40}. \text{ Ans.}$$

$$\begin{array}{r} (11) \\ 3 \overline{) 2} \\ \underline{3} \phantom{0} \\ 5 \phantom{0} \\ \underline{6} \phantom{0} \\ 1 \phantom{0} \\ \underline{3} \phantom{0} \\ 4 \phantom{0} \end{array} \quad \begin{array}{r} 2 \\ 2 \\ 7 \\ 4 \end{array}$$

$$135 \overline{) 112} = 1\frac{12}{135}. \text{ Ans.}$$

$$\begin{array}{r} 4 \quad (12) \\ 8 \overline{) 7} \\ \underline{8} \phantom{0} \\ 7 \phantom{0} \\ \underline{4} \phantom{0} \\ 5 \phantom{0} \\ \underline{8} \phantom{0} \\ 9 \phantom{0} \end{array} \quad \begin{array}{r} 7 \\ 3 \\ 5 \\ 9 \end{array}$$

$$128 \overline{) 135} = 1\frac{7}{128}. \text{ Ans.}$$

(13)

$$\begin{array}{r|l} \text{\$} & \text{\$} \\ \text{\$} & 2 \\ \text{\$} & \cancel{4} \\ 5 & \text{\$} \\ \hline 5 & 2 = \frac{2}{5}. \text{ Ans.} \end{array}$$

(14)

$$\begin{array}{r|l} 1 & 56 \\ 11 & 12 \\ \hline 11 & 672 = 61\frac{1}{11}. \text{ Ans.} \end{array}$$

(15)

$$\begin{array}{r|l} & 25 \\ 2 & \text{\$000} \\ & 133 \\ \hline 2 & 3325 = 1662\frac{1}{2}. \text{ Ans.} \end{array}$$

(16)

$$\begin{array}{r|l} 1 & 29 \\ & 72\text{\$} \\ \hline 2\text{\$} & 47 \\ \hline & 1363 = 1363. \text{ Ans.} \end{array}$$

(17)

$$\begin{array}{r|l} 8 & 7 \\ \text{\$} & \text{\$} \\ \text{\$} & 1 \\ \hline 8 & 7 = \frac{7}{8}. \text{ Ans.} \end{array}$$

(18)

$$\begin{array}{r|l} 3 & 26 \\ 11 & \text{\$00} \\ \hline 12 & 1 \\ \hline 33 & 26 = \frac{26}{33}. \text{ Ans.} \end{array}$$

(19)

$$\begin{array}{r|l} \text{\$} & 1 \\ 2 & \text{\$} 11 \\ 29 & 7 \\ \hline 58 & 77 = 1\frac{11}{58}. \text{ Ans.} \end{array}$$

(20)

$$\begin{array}{r|l} 3\text{\$} & 55 \\ 1 & 2 \\ 7 & 1 \\ \hline 21 & 55 = 2\frac{1}{21}. \text{ Ans.} \end{array}$$

(21)

$$\begin{array}{r|l} \text{\$} & 5 \\ 1 & \text{\$} 25 \\ 13 & \text{\$} \\ \hline 13 & 125 = 9\frac{8}{13}. \text{ Ans.} \end{array}$$

(22)

$$\begin{array}{r|l} 7 & 1681 \\ 5 & \text{\$} 2\text{\$} \text{\$} 1681 \\ & \text{\$} 40\text{\$} \text{\$} \\ \hline 35 & 1681 = 48\frac{1}{35}. \text{ Ans.} \end{array}$$

(23)

$$\begin{array}{r|l} 7 & \text{\$} \\ \text{\$} & 1\text{\$} \\ 19 & 20 \\ 1\text{\$} & 2 \\ \hline 133 & 40 = \frac{40}{133}. \text{ Ans.} \end{array}$$

(24)

$$\begin{array}{r|l} 8 & 79 \\ 25 & 3 \\ \hline 200 & 237 = 1\frac{37}{200}. \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{(25)} \\ 9 \overline{) 11} \phantom{0} \\ \underline{9} \phantom{0} \\ 20 \phantom{0} \\ \underline{18} \phantom{0} \\ 20 \phantom{0} \\ \underline{18} \phantom{0} \\ 2 \phantom{0} \end{array} \quad \begin{array}{l} 5 \\ 7 \\ 0 \\ 0 \end{array}$$

$$\frac{20}{121} \mid 7 = 7\frac{1}{11}. \quad \text{Ans.}$$

$$\begin{array}{r} \text{(26)} \\ 17 \overline{) 12} \phantom{0} \\ \underline{17} \phantom{0} \\ 1 \phantom{0} \end{array} \quad \begin{array}{l} 3 \\ 1 \end{array}$$

$$\frac{17}{17} \mid 3 = 3\frac{1}{17}. \quad \text{Ans.}$$

$$\begin{array}{r} \text{(27)} \\ 27 \overline{) 20} \phantom{0} \\ \underline{27} \phantom{0} \\ 1 \phantom{0} \end{array} \quad \begin{array}{l} 4 \\ 1 \end{array}$$

$$\frac{27}{27} \mid 4 = 4\frac{1}{27}. \quad \text{Ans.}$$

$$\begin{array}{r} \text{(28)} \\ 5 \overline{) 7} \phantom{0} \\ \underline{5} \phantom{0} \\ 2 \phantom{0} \end{array} \quad \begin{array}{l} 1 \\ 0 \\ 1 \end{array}$$

$$\frac{5}{10} \mid 1 = 1\frac{1}{10}. \quad \text{Ans.}$$

$$\begin{array}{r} \text{(29)} \\ 521 \overline{) 432} \phantom{0} \\ \underline{521} \phantom{0} \\ 1 \phantom{0} \end{array} \quad \begin{array}{l} 9 \\ 1 \end{array}$$

$$\frac{521}{521} \mid 9 = 9\frac{1}{521}. \quad \text{Ans.}$$

$$\begin{array}{r} \text{(30)} \\ 125 \overline{) 42} \phantom{0} \\ \underline{125} \phantom{0} \\ 2 \phantom{0} \end{array} \quad \begin{array}{l} 2 \\ 1 \end{array}$$

$$\frac{125}{125} \mid 2 = 2\frac{1}{125}. \quad \text{Ans.}$$

$$\begin{array}{r} \text{(31)} \\ 1 \overline{) 36} \phantom{0} \\ \underline{1} \phantom{0} \\ 0 \phantom{0} \end{array} \quad \begin{array}{l} 4 \\ 10 \end{array}$$

$$\frac{1}{1} \mid 40 = 40. \quad \text{Ans.}$$

$$\begin{array}{r} \text{(32)} \\ 1 \overline{) 420} \phantom{0} \\ \underline{1} \phantom{0} \\ 0 \phantom{0} \end{array} \quad \begin{array}{l} 140 \\ 8 \end{array}$$

$$\frac{1}{1} \mid 1120 = 1120. \quad \text{Ans.}$$

$$\begin{array}{r} \text{(33)} \\ 5 \overline{) 20} \phantom{0} \\ \underline{5} \phantom{0} \\ 0 \phantom{0} \end{array} \quad \begin{array}{l} 3 \\ 2 \end{array}$$

$$\frac{5}{5} \mid 6 = 1\frac{1}{5}. \quad \text{Ans.}$$

$$\begin{array}{r} \text{(34)} \\ 5 \overline{) 20} \phantom{0} \\ \underline{5} \phantom{0} \\ 0 \phantom{0} \end{array} \quad \begin{array}{l} 2 \\ 3 \end{array}$$

$$\frac{5}{5} \mid 6 = 1\frac{1}{5}. \quad \text{Ans.}$$

$$\begin{array}{r} \text{(35)} \\ 3 \overline{) 50} \phantom{0} \\ \underline{3} \phantom{0} \\ 20 \phantom{0} \\ \underline{20} \phantom{0} \\ 0 \phantom{0} \end{array} \quad \begin{array}{l} 9 \\ 27 \end{array}$$

$$\frac{3}{500} \mid 243 = 243\frac{3}{500}. \quad \text{Ans.}$$

$$\begin{array}{r} \text{(36)} \\ 9 \overline{) 15} \phantom{0} \\ \underline{9} \phantom{0} \\ 6 \phantom{0} \end{array} \quad \begin{array}{l} 7 \\ 16 \end{array}$$

$$\frac{9}{135} \mid 112 = 112\frac{1}{135}. \quad \text{Ans.}$$

$$\begin{array}{r} \text{(37)} \\ 5 \overline{) 9} \phantom{0} \\ \underline{5} \phantom{0} \\ 4 \phantom{0} \end{array} \quad \begin{array}{l} 4 \\ 8 \\ 7 \\ 4 \end{array}$$

$$\frac{3}{135} \mid 112 = 112\frac{1}{135}. \quad \text{Ans.}$$

$$\begin{array}{r} \text{(38)} \\ 2 \overline{) 1} \phantom{0} \\ \underline{2} \phantom{0} \\ 1 \phantom{0} \\ \underline{1} \phantom{0} \\ 0 \phantom{0} \end{array} \quad \begin{array}{l} 1 \\ 1 \\ 2 \\ 3 \end{array}$$

$$\frac{2}{2} \mid 3 = 1\frac{1}{2}. \quad \text{Ans.}$$

$$\begin{array}{r} \text{(39)} \\ 1 \overline{) 650} \quad 13 \\ 2 \overline{) 100} \overline{) 127} \\ \hline 2 \overline{) 1651} = 825\frac{1}{2}. \text{ Ans.} \end{array} \quad \begin{array}{r} \text{(40)} \\ 1 \overline{) 1273} \\ 17 \overline{) 56} \\ \hline 17 \overline{) 71288} = 4193\frac{1}{17}. \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{(41)} \\ 1 \overline{) 4324} \quad 1081 \\ 32 \overline{) 128} \overline{) 475} \\ \hline 32 \overline{) 513475} = 16046\frac{3}{32}. \end{array} \quad \begin{array}{r} \text{(42)} \\ 9 \overline{) 807} \\ 8 \overline{) 1} \\ \hline 9 \overline{) 7} = \frac{1}{9}. \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{(43)} \\ 1 \overline{) 9112} \quad 8 \\ 21 \overline{) 42} \overline{) 1} \\ \hline 27 \overline{) 8} = \frac{8}{27}. \text{ Ans.} \end{array} \quad \begin{array}{r} \text{(44)} \\ 3 \overline{) 19} \\ 10 \overline{) 2} \\ \hline 3 \overline{) 1} = \frac{1}{3}. \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{(45)} \\ 1 \overline{) 100} \quad 20 \\ 7 \overline{) 35} \overline{) 8} \\ \hline 7 \overline{) 160} = 22\frac{6}{7}. \text{ Ans.} \end{array} \quad \begin{array}{r} \text{(46)} \\ 11 \overline{) 1453} \quad 37 \\ 71 \overline{) 213} \overline{) 333} \\ \hline 71 \overline{) 53761} = 686\frac{53}{71}. \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{(47)} \\ 1 \overline{) 1000} \quad 10 \\ 3 \overline{) 3} \overline{) 3} \\ \hline 3 \overline{) 10} = 3\frac{1}{3}. \text{ Ans.} \end{array} \quad \begin{array}{r} \text{(48)} \\ 5 \overline{) 80} \quad 2 \\ 47 \overline{) 3} \\ \hline 5 \overline{) 6} = 1\frac{1}{5}. \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{(49)} \\ 3 \overline{) 43} \\ 3 \overline{) 8} \\ 3 \overline{) 2} \\ \hline 9 \overline{) 86} = 9\frac{4}{9}. \text{ Ans.} \end{array} \quad \begin{array}{r} \text{(50)} \\ 2 \overline{) 2002} \quad 13013 \\ 90 \overline{) 1} \\ \hline 180 \overline{) 13013} = 72\frac{13}{180}. \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{(51)} \\ 3 \overline{) 21} \\ 1 \overline{) 8} \\ \hline 4 \overline{) 21} = 5\frac{1}{4} \text{ lbs. Ans.} \end{array} \quad \begin{array}{r} \text{(52)} \\ 8 \overline{) 7} \\ 4 \overline{) 5} \\ \hline 32 \overline{) 35} = 1\frac{3}{32} \text{ yards. Ans.} \end{array}$$

$$\begin{array}{r} 2 \overline{) 53} \quad 3 \\ \underline{40} \quad 13 \\ \underline{10} \quad 3 \\ 2 \mid 3 = 1\frac{1}{2} \text{ bush. } \textit{Ans.} \end{array}$$

$$\begin{array}{r} 2 \overline{) 54} \\ \underline{40} \quad 14 \\ \underline{10} \quad 4 \\ 2 \mid 8 = 4 \text{ horses. } \textit{Ans.} \end{array}$$

$$\begin{array}{r} (55) \\ 2 \overline{) 5} \quad 7 \\ \underline{10} \quad 7 = \$\frac{7}{10}. \textit{Ans.} \end{array}$$

$$\begin{array}{r} (56) \\ 7 \overline{) 6} \quad 18 \\ \underline{5} \quad 18 \\ 35 \mid 108 = \$3\frac{3}{5}. \textit{Ans.} \end{array}$$

$$\begin{array}{r} (57) \\ 5 \overline{) 2} \quad 8 \\ \underline{3} \quad 8 \\ 15 \mid 16 = \$1\frac{1}{3}. \textit{Ans.} \end{array}$$

$$\begin{array}{r} 58) 6 \\ 7 \overline{) 12} \quad 6 \\ \underline{7} \quad 12 \\ 2 \mid 6 \text{ gallons. } \textit{Ans.} \end{array}$$

$$\begin{array}{r} 6 \overline{) 59} \quad 5 \\ \underline{54} \quad 5 \\ \underline{7} \quad 5 \\ 6 \mid 5 = \frac{5}{6} \text{ of the whole.} \end{array}$$

$$\begin{array}{r} (60) \quad 21 \\ 4 \overline{) 63} \quad 21 \\ \underline{4} \quad 21 \\ 3 \mid 21. \textit{Ans.} \end{array}$$

$$\begin{array}{r} (61) \quad 73 \\ 8 \overline{) 14} \quad 73 \\ \underline{8} \quad 14 \\ 8 \mid 219 = 27\frac{3}{8}. \textit{Ans.} \end{array}$$

$$\begin{array}{r} (62) \quad 289 \\ 41 \overline{) 56} \quad 289 \\ \underline{41} \quad 56 \\ 41 \mid 576 = 14\frac{1}{4}. \textit{Ans.} \end{array}$$

$$\begin{array}{r} (63) \\ 8 \overline{) 5} \quad 7 \\ \underline{8} \quad 7 \\ \underline{3} \quad 7 \\ 121 \overline{) 363} \quad 8 \\ \underline{363} \quad 56 = \frac{56}{363}. \textit{Ans.} \end{array}$$

$$\begin{array}{r} (64) \quad 2 \\ 25 \overline{) 12} \quad 2 \\ \underline{25} \quad 2 \\ 25 \mid 2 = \frac{2}{25}. \textit{Ans.} \end{array}$$

$$\begin{array}{r} (65) \\ 7 \overline{) 21} \quad 3 \\ \underline{21} \quad 2 \\ 49 \mid 2 = \$\frac{2}{49}. \textit{Ans.} \end{array}$$

$$\begin{array}{r} (66) \\ 4 \overline{) 3} \quad 7 \\ \underline{4} \quad 7 \\ 4 \mid 21 = \$5\frac{1}{4}. \textit{Ans.} \end{array}$$

$$\begin{array}{r} 3 \overline{) 496} \quad (67) \\ \underline{17} \phantom{00} 2 \\ 51 \overline{) 992} = 19\frac{2}{3} \text{ lbs. } A. \end{array} \quad \begin{array}{r} 5 \overline{) 37} \quad (68) \\ \underline{75} \phantom{00} 2 \\ 5 \overline{) 74} = 14\frac{2}{5} \text{ barrels. } Ans. \end{array}$$

$$\begin{array}{r} 9 \overline{) 4} \quad (69) \\ \underline{0} \phantom{00} 4 \\ 9 \overline{) 4} = \frac{4}{9}. \text{ } Ans. \end{array} \quad \begin{array}{r} 8 \overline{) 61} \quad (70) \\ \underline{8} \phantom{00} 1 \\ 64 \overline{) 61} = \frac{61}{64}. \text{ } Ans. \end{array}$$

$$\begin{array}{r} 3 \overline{) 40} \quad (71) \\ \underline{12} \phantom{00} 8 \\ 3 \overline{) 40} = 13\frac{1}{3}. \text{ } Ans. \end{array} \quad \begin{array}{r} 16 \overline{) 1737} \quad (72) \\ \underline{112} \phantom{00} 193 \\ 16 \overline{) 1737} = 108\frac{1}{16} \text{ bu. } Ans. \end{array}$$

$$\begin{array}{r} 4 \overline{) 12} \quad (73) \\ \underline{27} \phantom{00} 3 \\ 4 \overline{) 12} = 3 \text{ yd. } Ans. \end{array} \quad \begin{array}{r} 7 \overline{) 28} \quad (74) \\ \underline{14} \phantom{00} 2 \\ 7 \overline{) 28} = 4 \text{ days. } Ans. \end{array}$$

$$\begin{array}{r} 2 \overline{) 49} \quad (75) \\ \underline{07} \phantom{00} 7 \\ 2 \overline{) 49} = 24\frac{1}{2} \text{ bottles. } A. \end{array} \quad \begin{array}{r} 9 \overline{) 13} \quad (76) \\ \underline{11} \phantom{00} 13 \\ 9 \overline{) 13} = 1\frac{1}{9} \text{ days. } Ans. \end{array}$$

$$\begin{array}{r} 2 \overline{) 21} \quad (77) \\ \underline{14} \phantom{00} 7 \\ 2 \overline{) 21} = 10\frac{1}{2}. \text{ } Ans. \end{array} \quad \begin{array}{r} 2 \overline{) 9} \quad (78) \\ \underline{04} \phantom{00} 9 \\ 2 \overline{) 9} = 4\frac{1}{2}. \text{ } Ans. \end{array}$$

$$\begin{array}{r} 8 \overline{) 6} \quad (79) \\ \underline{05} \phantom{00} 6 \\ 8 \overline{) 6} = \frac{3}{4}. \text{ } Ans. \end{array} \quad \begin{array}{r} 8 \overline{) 105} \quad (80) \\ \underline{064} \phantom{00} 21 \\ 8 \overline{) 105} = 13\frac{1}{8} \text{ times. } Ans. \end{array}$$

$$\begin{array}{r} (81) \\ 5 \overline{) 22} \phantom{2} \\ \underline{11} \phantom{2} \\ 5 \overline{) 11} \phantom{2} \\ \underline{5} \phantom{2} \\ 6 \phantom{2} \end{array} \quad \begin{array}{l} 2 \\ 2 \\ 4 = 2\frac{1}{2} \end{array} \quad \text{Ans.}$$

$$\begin{array}{r} (82) \\ 25 \overline{) 508} \\ \underline{50} \phantom{0} \\ 8 \phantom{0} \\ 8 \phantom{0} \\ \underline{0} \phantom{0} \\ 8 \phantom{0} \end{array} \quad \begin{array}{l} 20 \\ 4 \\ 3 \\ 6096 \end{array} \quad \text{Ans.}$$

$$\begin{array}{r} (83) \\ 3 \overline{) 65} \\ \underline{3} \phantom{0} \\ 3 \phantom{0} \\ \underline{3} \phantom{0} \\ 0 \phantom{0} \end{array} \quad \begin{array}{l} 22 \\ 2 \\ 2 \\ 130 = 26\frac{1}{2} \end{array} \quad \text{Ans.}$$

$$\begin{array}{r} (84) \\ 15 \overline{) 181} \\ \underline{15} \phantom{0} \\ 31 \\ \underline{30} \\ 1 \phantom{0} \\ 15 \overline{) 262} \end{array} \quad \begin{array}{l} 12 \\ 7 \\ 2 \\ 262 = 17\frac{1}{2} \end{array} \quad \text{weeks. A.}$$

## COMPLEX FRACTIONS.

$$\begin{array}{r} (1) \\ 6 \overline{) 5} \\ \underline{4} \phantom{0} \\ 2 \phantom{0} \end{array} \quad \begin{array}{l} 5 \\ 5 \\ 24 \overline{) 25} = 1\frac{1}{24} \end{array} \quad \text{Ans.}$$

$$\begin{array}{r} (2) \\ 9 \overline{) 8} \\ \underline{15} \phantom{0} \\ 185 \overline{) 128} \end{array} \quad \begin{array}{l} 8 \\ 16 \\ 12\frac{2}{3} \end{array} \quad \text{Ans.}$$

$$\begin{array}{r} (3) \\ 9 \overline{) 14} \\ \underline{9} \phantom{0} \\ 5 \phantom{0} \end{array} \quad \begin{array}{l} 14 \\ 16 \\ 81 \overline{) 224} = 2\frac{8}{81} \end{array} \quad \text{Ans.}$$

$$\begin{array}{r} (4) \\ 2 \overline{) 25} \\ \underline{17} \phantom{0} \\ 8 \phantom{0} \end{array} \quad \begin{array}{l} 25 \\ 4 \\ 100 \end{array} \quad \text{Ans.}$$

$$\begin{array}{r} (5) \\ 9 \overline{) 8} \\ \underline{9} \phantom{0} \\ 81 \overline{) 16} = 1\frac{8}{81} \end{array} \quad \begin{array}{l} 8 \\ 2 \\ 16 \end{array} \quad \text{Ans.}$$

$$\begin{array}{r} (6) \\ 7 \overline{) 5} \\ \underline{12} \phantom{0} \\ 7 \overline{) 5} = \frac{5}{7} \end{array} \quad \begin{array}{l} 5 \\ 1 \\ 5 \end{array} \quad \text{Ans.}$$

$$\begin{array}{r} (7) \\ 4 \overline{) 5} \\ \underline{4} \phantom{0} \\ 4 \overline{) 5} = 1\frac{1}{4} \end{array} \quad \begin{array}{l} 5 \\ 5 \\ 5 \end{array} \quad \text{Ans.}$$

$$\begin{array}{r} (8) \\ 1 \overline{) 5} \\ \underline{1} \phantom{0} \\ 1 \overline{) 5} = 5 \end{array} \quad \begin{array}{l} 5 \\ 5 \\ 35 \end{array} \quad \text{Ans.}$$



$$\begin{array}{r} 9 \text{ (9)} \\ 61 \text{ } 99 \text{ } 50 \\ \underline{400} \quad \underline{77} \quad 7 \\ 549 \mid 350 = 2\frac{1}{2} \text{ } \text{Ans.} \end{array} \quad \begin{array}{r} 7 \text{ (10)} \\ 17 \text{ } 35 \text{ } 306 \\ \underline{51} \quad \underline{21} \quad 5 \\ 119 \mid 306 = 2\frac{6}{11} \text{ } \text{Ans.} \end{array}$$

$$\begin{array}{r} (11) \\ 7 \text{ } 5 \text{ } 93 \\ \underline{42} \quad \underline{27} \quad 4 \\ 7 \mid 372 = 53\frac{1}{7} \text{ } \text{Ans.} \end{array} \quad \begin{array}{r} (12) \\ 2 \text{ } 8 \text{ } \\ \underline{10} \quad \underline{3} \quad 3 \\ 4 \text{ } 30 \text{ } 3 \\ \underline{13} \quad \underline{1} \\ 64 \mid 9 = \frac{9}{64} \text{ } \text{Ans.} \end{array}$$

## APPLICATIONS.

$$\begin{array}{r} (1) \\ 6 \text{ } 1 \\ 7 \text{ } 3 \\ 5 \text{ } 5 \\ \underline{1} \quad \underline{21} \\ \$15. \text{ } \text{Ans.} \end{array} \quad \begin{array}{r} (2) \\ 5 \text{ } 11 \\ 3 \text{ } 8 \\ 5 \mid 88 = \$17\frac{1}{2} \text{ } \text{A.} \end{array} \quad \begin{array}{r} (3) \\ 7 \text{ } 5 \text{ } 129 \\ \underline{21} \quad \underline{38} \quad 7 \\ 35 \mid 258 = 7\frac{1}{2} \text{ miles. } \text{A} \end{array}$$

$$(4) \quad \frac{2}{3} \times \frac{34}{5} = \frac{68}{15}; \frac{68}{15} - \frac{6}{15} = \frac{122}{15}; \frac{122}{15} \times \frac{83}{4} = \frac{59226}{1404} = 42\frac{17}{12} \text{ } \text{Ans.}$$

$$(5) \quad \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} = \frac{248}{120}; \frac{248}{120} \times \frac{3}{4} = \frac{62}{15}; \frac{1}{2} + \frac{1}{3} + \frac{1}{5} = \frac{13}{10}; \frac{62}{15} - \frac{13}{10} = \frac{41}{30} \text{ } \text{Ans.}$$

(6)

$$\frac{19}{2} \times \frac{5}{3} \times \frac{20}{9} = \frac{1900}{27} = \$26\frac{7}{27} \text{ } \text{Ans.}$$

(7)

$$\frac{2}{3} \times \frac{8}{7} = \$\frac{16}{21} \text{ price of 1 yard; } \frac{5}{7} \times \frac{21}{16} = 15 \text{ yards. } \text{Ans.}$$

$$\begin{array}{r|l} (8) & 7 \\ 3 & 14 \\ \hline 2 & 7 \\ 3 & 49 = \$16\frac{1}{2}. \end{array} \text{ Ans.}$$

$$\begin{array}{r|l} (9) & \\ 7 & 101 \\ \hline & 4 \\ & \$ \\ & \$ \\ & 7 \\ & \$ \\ & 1 \\ \hline 112 & 101 = 10\frac{1}{2}. \end{array} \text{ Ans.}$$

$$\begin{array}{r} (10) \\ 49\frac{5}{8} + \frac{34\frac{3}{5}}{97} = \frac{397}{146\frac{3}{11}} = \frac{1903}{776} + \frac{4670593}{8045} = 6242920 \text{ sum;} \\ \frac{397}{776} - \frac{1903}{8045} = \frac{1717137}{6242920} \text{ Diff.} \end{array}$$

$$\begin{array}{r|l} (11) & 5 \\ 3 & 20 \\ \hline 4 & 5 \\ 3 & 25 = 8\frac{1}{3} \text{ bu.} \end{array} \quad \begin{array}{l} (12) \\ \frac{3}{4} \text{ of a league} = 2 \text{ mi. } 0 \text{ fur. } 00 \text{ rd.} \\ \frac{1}{16} \text{ of a mile} = 5 \text{ fur. } 24 \text{ rd.} \\ 1 \text{ mi. } 2 \text{ fur. } 16 \text{ rd.} \end{array}$$

$$\begin{array}{l} (13) \\ \frac{3}{4} \text{ of a cwt.} = 2 \text{ qr. } 7 \text{ lb. } 2 \text{ oz. } 4\frac{1}{2} \text{ dr.} \\ 8\frac{5}{8} \text{ pounds} = 8 \text{ lb. } 13 \text{ oz. } 5\frac{1}{2} \text{ dr.} \\ 1 \text{ qr. } 23 \text{ lb. } 4 \text{ oz. } 15\frac{5}{8} \text{ dr.} \end{array} \text{ Ans.}$$

$$\begin{array}{l} (14) \\ 4\frac{9}{10} \text{ miles} = 4 \text{ ms. } 7 \text{ fur. } 8 \text{ rd.} \\ \frac{2}{7} \text{ of a fur.} = 11 \text{ rd. } 2 \text{ yd. } 1\frac{1}{2} \text{ ft.} \\ \frac{2}{5} \text{ of } 1\frac{1}{2} \text{ yds.} = 2\frac{1}{10} \text{ ft.} \\ 4 \text{ mi. } 7 \text{ fur. } 19 \text{ rd. } 3 \text{ yd. } 0\frac{2}{5} \text{ ft.} \end{array} \text{ Ans.}$$

$$\begin{array}{r|l} (15) & 61 \\ 3 & 183 \\ \hline 3 & 61 = 20\frac{1}{3}. \end{array} \text{ Ans.} \quad \begin{array}{r|l} (16) & \\ 3 & 29 \\ \hline 3 & 87 \\ 3 & 37 \\ 3 & 37 = \$12\frac{1}{2}. \end{array} \text{ Ans.}$$

$$\begin{array}{l} (17) \\ 634 - 124 = 510, \text{ which is } \frac{5}{8} \text{ of } 2\frac{1}{4} = \frac{15}{8} \text{ times B's number;} \\ 510 \div \frac{15}{8} = 272 \text{ B's number.} \end{array} \text{ Ans.}$$

( 18 ) $\begin{array}{r l} 2\cancel{5} & \text{\textit{¢}} 13 \\ \text{\textit{¢}} & 32\cancel{5} \\ \hline & 13 \text{ yds. A.} \end{array}$	( 19 ) $\begin{array}{r l} 47 & 5 \\ \text{\textit{¢}} & 141 \\ \hline 235 & 141 = \text{\textit{¢}} \frac{141}{5} \text{ A.} \end{array}$	( 20 ) $\begin{array}{r l} \text{\textit{¢}} & 3\cancel{3} 2 \\ \text{\textit{¢}} & 1\cancel{6} \\ \hline 11 & 7 \\ \hline & 14 \text{ bushels. Ans.} \end{array}$
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( 21 )  
 $100 \div 14\frac{2}{3} = 6\frac{2}{7}; 27\frac{2}{3} - 6\frac{2}{7} = 20\frac{1}{4} \text{ Ans.}$

( 22 )  
 $\frac{2}{7}$  of \$6300 = \$2700 A's share ;  $\frac{4}{5}$  of \$6300 = \$2800 B's share ;  
 $2700 + 2800 = \$5500$  ;  $6300 - 5500 = \$800$ , C's share. *Ans.*

( 23 )  
 $\frac{3}{4} - \frac{2}{5} = \frac{3}{20}$  ;  $1 - \frac{3}{20} = \frac{17}{20}$  ; since 1 diminished by  $\frac{3}{20}$  of itself  
leaves  $\frac{17}{20}$  of itself, *any number* diminished by  $\frac{3}{20}$  of itself will  
leave  $\frac{17}{20}$  of itself ; hence, 34 is  $\frac{17}{20}$  of the required number ;  
 $34 \div \frac{17}{20} = 40 \text{ Ans.}$

( 24 )  
 $\frac{1}{2}$  of a week = 2da. 8hr.  
 $\frac{1}{2}$  of a day = 6hr.  
 $\frac{1}{2}$  of an hour =  $\frac{30m.}{2da. \ 14hr. \ 30m.}$  *Ans.*

( 25 )  
 $\frac{2}{3}$  of £15 = £4 5s. 8d.  $2\frac{2}{3}$  far.  
£3 $\frac{2}{3}$  = £3 8s. 6d.  $3\frac{2}{3}$  far.  
 $\frac{1}{2}$  of  $\frac{5}{7}$  of  $\frac{2}{3}$  of £1 = 2s. 10d.  $1\frac{1}{4}$  far.  
 $\frac{2}{3}$  of  $\frac{2}{3}$  of a shilling = 3d.  $1\frac{1}{4}$  far.  
 $\underline{\text{£7 } 17s. \ 5d. \ 0\frac{1}{4} \text{ far. Ans.}}$

( 26 )  
John must have 6 shares and James 8 shares of the marbles,  
and both must have 14 shares ; therefore, John has  $\frac{6}{14}$  of 56 =  
24 marbles, and James  $\frac{8}{14}$  of 56 = 32 marbles. *Ans.*

( 27 )

$\frac{2}{3}$  of 2000 =  $857\frac{1}{3}$  acres ;  $\frac{2}{3}$  of  $857\frac{1}{3}$  =  $571\frac{2}{3}$  acres sold ;  
 $857\frac{1}{3} - 571\frac{2}{3} = 285\frac{1}{3}$  acres retained. *Ans.*

( 28 )

$\frac{1}{2}$  of 240 = 80, A's ;  $\frac{1}{6}$  of 240 = 24, B's ;  $\frac{1}{3}$  of 240 = 30, C's ;  
 $\frac{1}{6}$  of 240 = 40, D's ;  $80 + 24 + 30 + 40 = 174$  ;  $240 - 174 = 66$ ,  
 the remainder.

( 29 )

$\frac{1}{3}$  of 3740 =  $\$1246\frac{2}{3}$  ;  $1246\frac{2}{3} + 156\frac{1}{3} = \$1403$ , whole gain ;  
 $\$1403 \div 3 = \$467\frac{2}{3}$ , annual gain. *Ans.*

( 30 )

$\frac{2}{4} + \frac{7}{8} = 1\frac{3}{8} = \$1\frac{5}{8}$ , what they gave for it ;  $1\frac{5}{8} + \frac{7}{8} = \$2\frac{1}{8}$ , what they  
 sold it for ; the first paid 6 parts as often as the second paid 7  
 parts ; therefore, the first must have  $\frac{6}{13}$  of  $\frac{7}{8}$  =  $\$ \frac{42}{208}$  ; and the  
 second  $\frac{7}{13}$  of  $\frac{7}{8}$  =  $\$ \frac{49}{208}$ . *Ans.*

( 31 )

$\frac{5}{8}$  of  $126\frac{5}{7} = 79\frac{2}{7}$  bushels ;  $79\frac{2}{7} \times \$2\frac{1}{2} = \$174\frac{3}{7}$  ;  
 $126\frac{5}{7} - 79\frac{2}{7} = 47\frac{3}{7}$  bushels ;  $47\frac{3}{7} \times 1\frac{3}{4} = \$ 83\frac{1}{4}$  ;  
 $\$257\frac{19}{28}$ . *Ans.*

( 32 )

$1\frac{1}{2} + \frac{3}{4} = \frac{5}{4} = \$2\frac{1}{4}$  ;  $\$19\frac{1}{8} \div 2\frac{1}{4} = 7\frac{1}{2}$  bushels. *Ans.*

( 33 )

$\$492\frac{3}{4} = \frac{2}{3}$  of the capital ;  $\$492\frac{3}{4} \div 2 = \$246\frac{1}{4}$ , which is  $\frac{1}{3}$   
 of the capital ;  $\$246\frac{1}{4} \times 7 = \$1724\frac{1}{4}$  A's share ;  $\$246\frac{1}{4} \times 5 =$   
 $\$1231\frac{1}{4}$  B's share. *Ans.*

( 34 )

$63 \div \frac{7}{8} = 72$ , what he had in the second field ;  $\frac{2}{3}$  of 72 = 120 ;  
 $120 \div 4 = 30$ , what he had in the third field ;  $63 + 72 + 30 =$   
 165 sheep. *Ans.*

## DUODECIMALS.

## ADDITION AND SUBTRACTION.

(1)

$$86' \div 12 = 7ft. 2'. \text{ Ans.}$$

(2)

$$750'' \div 12 = 62' 6''; 62' \div 12 = 5ft. 2'; \\ 5ft. 2' 6''. \text{ Ans.}$$

(3)

$$37000''' \div 12 = 3083'' 4'''; 3083'' \div 12 = 256' 11''; \\ 256' \div 12 = 21ft. 4'; 21ft. 4' 11'' 4'''. \text{ Ans.}$$

(4)

$$67' \div 12 = 5ft. 7'. \text{ Ans.}$$

(5)

$$470''' \div 12 = 39'' 2'''; 39'' \div 12 = 3' 3''; \\ 3' 3'' 2'''. \text{ Ans.}$$

(6)

$$375'' \div 12 = 31' 3''; 31' \div 12 = 2ft. 7'; \\ 2ft. 7' 3''. \text{ Ans.}$$

(7)

$$\begin{array}{r} 8ft. \ 9' \ 7'' \\ 6ft. \ 7' \ 3'' \ 4''' \\ \hline 15ft. \ 4' \ 10'' \ 4''' \text{ Ans.} \end{array}$$

(8)

$$\begin{array}{r} 32ft. \ 6' \ 6'' \ 0''' \\ 29ft. \ 0 \ 0 \ 7''' \\ \hline 3ft. \ 6' \ 5'' \ 5''' \text{ Ans.} \end{array}$$

(9)

$$\begin{array}{r} 9ft. \ 6' \ 4'' \ 3''' \\ 12 \ 2 \ 9 \ 10 \\ 26 \ 0 \ 5 \\ 40 \ 1 \ 0 \ 3 \\ \hline 87ft. \ 10' \ 7'' \ 4''' \text{ Ans.} \end{array}$$

(10)

$$\begin{array}{r} 125ft. \ 0' \ 6'' \ 0''' \\ 45 \ 11 \ 0 \ 2 \\ 12 \ 6 \\ \hline 183ft. \ 5' \ 6'' \ 2''' \text{ A.} \end{array}$$

( 11 )				( 12 )				
84ft.	7'	00''	00'''	127ft.	3'	0''	4'''	11''''
96	0	11	00	40	0	10	7	5
42	6	9	10	<u>87ft.</u>	<u>2'</u>	<u>7''</u>	<u>9'''</u>	<u>6''''</u>
	5	7	11					A.
<u>223ft.</u>	<u>8'</u>	<u>4''</u>	<u>9'''</u>	Ans.				

( 13 )				( 14 )			
425ft.	9'	10''	0'''	325ft.	7'	6''	2'''
107	10	9	8	217	10	9	0
<u>317ft.</u>	<u>11'</u>	<u>0''</u>	<u>4'''</u>	543ft.	6'	3''	2'''
Ans.				107ft.	8'	9''	2'''
				Diff.			sum.

( 15 )			
1001ft.	0'	0''	10'''
720	10	9	1
<u>1721ft.</u>	<u>10'</u>	<u>9''</u>	<u>11'''</u>
280ft.	1'	3''	9'''
			Diff.
			sum.

## MULTIPLICATION.

( 2 )		
9ft.	6'	
<u>4</u>	<u>7</u>	
38		
5	6'	6''
<u>43sq. ft.</u>	<u>6'</u>	<u>6''</u>
		Ans.

( 3 )		
12ft.	5'	
<u>6</u>	<u>8</u>	
74	6'	
8	3'	4''
<u>82sq. ft.</u>	<u>9'</u>	<u>4''</u>
		Ans.

( 4 )		
35ft.	4'	6''
<u>9</u>	<u>10'</u>	
318	4'	6''
29	5'	9''
<u>347sq. ft.</u>	<u>10'</u>	<u>3''</u>
		A.

( 5 )			
45ft.	4'	3''	
<u>12</u>	<u>2</u>	<u>9</u>	
544	3'		
7	6'	8''	6'''
2	10	0	2
<u>554sq. ft.</u>	<u>7'</u>	<u>8''</u>	<u>8'''</u>
			A.

(6)

$$\begin{array}{r}
 140\text{ft.} \quad 0' \quad 2'' \quad 4''' \\
 20 \quad 10 \\
 \hline
 2800 \quad 3' \quad 10'' \quad 8''' \\
 116 \quad 8 \quad 1 \quad 11 \quad 4 \\
 \hline
 2917\text{sq. ft.} \quad 0' \quad 0'' \quad 7''' \quad 4'''' \quad A.
 \end{array}$$

(7)

$$\begin{array}{r}
 279\text{ft.} \quad 10' \quad 6'' \\
 \quad \quad 8 \quad 4 \\
 \hline
 186\text{ft.} \quad 7' \\
 7 \quad 9 \quad 3 \quad 6 \\
 \hline
 194\text{sq. ft.} \quad 4' \quad 3'' \quad 6''' \quad A.
 \end{array}$$

(8)

$$\begin{array}{r}
 14\text{ft.} \quad 6' \quad 3'' \\
 2 \quad 9 \\
 \hline
 29 \quad 0' \quad 6'' \\
 10 \quad 10 \quad 8 \quad 3''' \\
 \hline
 39\text{sq. ft.} \quad 11' \quad 2'' \quad 3''' \quad A.
 \end{array}$$

(9)

$$\begin{array}{r}
 18\text{ft.} \quad 9' \\
 15 \quad 10 \\
 \hline
 281 \quad 3' \\
 15 \quad 7 \quad 6'' \\
 \hline
 296\text{sq. ft.} \quad 10' \quad 6'' \quad Ans.
 \end{array}$$

(10)

$$\begin{array}{r}
 70\text{ft.} \quad 9' \\
 12 \quad 3 \\
 \hline
 849 \quad 0' \\
 17 \quad 8 \quad 3'' \\
 \hline
 96\text{sq. yd.} \quad 2\text{sq. ft.} \quad 8' \quad 3'' \quad A.
 \end{array}$$

(11)

$$\begin{array}{r}
 64\text{ft.} \quad 6' \\
 64 \quad 6 \\
 \hline
 4128 \quad 0' \\
 32 \quad 3 \\
 \hline
 4160\text{sq. ft.} \quad 3'
 \end{array}$$

$$4160\frac{1}{2}\text{sq. ft.} \times .05 = \$208.01\frac{1}{2} \quad Ans.$$

(12)

$$\begin{array}{r}
 6\text{ft.} \quad 9' \\
 4 \quad 8 \\
 \hline
 27 \quad 0' \\
 4 \quad 6 \\
 \hline
 31 \quad 6' \\
 2 \quad 10 \\
 \hline
 63 \quad 0' \\
 26 \quad 3 \\
 \hline
 89\text{cu. ft.} \quad 3' \quad A.
 \end{array}$$

(13)

$$\begin{array}{r}
 97\text{ft.} \quad 4' \\
 9 \quad 6 \\
 \hline
 876 \quad 0' \\
 48 \quad 8 \\
 \hline
 924\text{sq. ft.} \quad 8'
 \end{array}$$

$$924\frac{2}{3}\text{sq. ft.} \div 9 = 102\frac{2}{3}\text{sq. yd.};$$

$$102\frac{2}{3} \times .18 = \$18.49\frac{1}{3} \quad Ans.$$

( 14 )

36ft.	5'
6	8'
<hr/>	
218	6'
24	3' 4''
<hr/>	
242	9' 4''
3	6'
<hr/>	
728	4'
121	4' 8''
<hr/>	
849cu. ft.	8' 8'' Ans

( 15 )

26ft.	8'
6	6'
<hr/>	
160	0'
13	4'
<hr/>	
173	4'
3	3'
<hr/>	
520	0'
43	4'
<hr/>	
563cu. ft.	4'

$$563\frac{1}{3} \text{ cu. ft. } \div 128 = 4\frac{77}{128} \text{ cords ;}$$

$$4\frac{77}{128} \times \$3.50 = \$15.403 \frac{1}{2} \text{ Ans.}$$

( 16 )

38ft.	10'
20	6'
<hr/>	
776	8'
19	5'
<hr/>	
796	8'
9	4'
<hr/>	
7164	9'
285	4' 4''
<hr/>	
27)7430 feet	1' 4''
<hr/>	
275	$\frac{46}{143}$ cubic yards. Ans.

( 17 )

22ft.	8'	22ft.	8'
22ft.	8'	18ft.	9'
18ft.	9'	<hr/>	
18ft.	9'	425sq. ft. 0' ceiling.	
<hr/>		•	
82ft.	10'	139sq. ft. 4' windows.	
11	6'	47sq. ft. 6' doors.	
<hr/>		76sq. ft. 6' base.	
911	2	<hr/>	
41	5	263sq. ft. 4'	
<hr/>		952sq. ft. 7' sides of the room.	
<hr/>		425sq. ft. 0 ceiling of the room.	
<hr/>		1377sq. ft. 7'	
<hr/>		263sq. ft. 4'	
<hr/>		9)1114sq. ft. 3'	
<hr/>		123 $\frac{2}{3}$ sq. yd. : 123 $\frac{2}{3}$ × 16 = \$19,80 $\frac{2}{3}$ . Ans.	



## DIVISION.

(1)

$$\begin{array}{r}
 6\text{ft. } 4' 29\text{sq. ft. } 0' \quad 4'' (4\text{ft. } 7' \text{ Ans.} \\
 \underline{25 \quad 4} \\
 3 \quad 8' \quad 4'' \\
 \underline{3 \quad 8' \quad 4''}
 \end{array}$$

(2)

$$\begin{array}{r}
 9\text{ft. } 6' 49\text{sq. ft. } 0' \quad 10'' \quad 6''' (5\text{ft. } 4' \quad 11'' \frac{8}{15} \text{ Ans.} \\
 \underline{47 \quad 6} \\
 1 \quad 6' \quad 10'' \\
 \underline{9 \quad 6} \\
 9' \quad 4'' \quad 6''' \\
 \underline{8 \quad 8 \quad 6} \quad \quad \quad \frac{8'' \quad 0''' \quad 16''}{9 \quad 6' \quad 19} \\
 8'' \quad 0'';
 \end{array}$$

(3)

$$\begin{array}{r}
 24\text{ft. } 3' 1176\text{sq. ft. } 1' \quad 6'' (48\text{ft. } 6' \text{ Ans.} \\
 \underline{1184 \quad 0'} \\
 12 \quad 1' \quad 6'' \\
 \underline{12 \quad 1' \quad 6''}
 \end{array}$$

(4)

$$\begin{array}{r}
 3\text{ft. } 4' 119\text{cu. ft. } 2' \quad 6'' \quad 8''' (35\text{sq. ft. } 9' \quad 2'' \text{ Ans.} \\
 \underline{116 \quad 8'} \\
 2 \quad 4' \quad 6'' \\
 \underline{2 \quad 6'} \\
 6'' \quad 8''' \\
 \underline{6'' \quad 8'''}
 \end{array}$$

$$\begin{array}{r}
 4\text{ft. } 2' 35\text{sq. ft. } 9' \quad 2'' (8\text{ft. } 7' \text{ Ans.} \\
 \underline{33 \quad 4'} \\
 2 \quad 5' \quad 2'' \\
 \underline{2 \quad 5' \quad 2''}
 \end{array}$$

( 5 )

$$\begin{array}{r}
 3ft. \quad 9')105cu.ft. \quad 5' \quad 7'' \quad 6'''(28ft. \quad 1' \quad 6'' \\
 \underline{105} \quad 0' \\
 \quad 5' \quad 7'' \\
 \quad 3' \quad 9'' \\
 \quad \underline{1' \quad 10'' \quad 6'''} \\
 \quad 1' \quad 10'' \quad 6'''
 \end{array}$$

$$\begin{array}{r}
 2ft. \quad 3')28sq.ft. \quad 1' \quad 6''(12ft. \quad 6'. \quad Ans. \\
 \underline{27} \quad 0' \\
 \quad 1 \quad 1' \quad 6'' \\
 \quad \underline{1 \quad 1' \quad 6''}
 \end{array}$$

( 6 )

$$\begin{array}{r}
 10ft. \quad 7')394sq.ft.2' \quad 9''(37ft. \quad 3'. \quad Ans. \\
 \underline{391} \quad 7' \\
 \quad 2 \quad 7' \quad 9'' \\
 \quad \underline{2 \quad 7' \quad 9''}
 \end{array}$$

( 7 )

$$\begin{array}{r}
 17ft. \quad 6')27sq.ft. \quad 8' \quad 6''(1ft. \quad 7'. \quad Ans. \\
 \underline{17} \quad 6' \\
 \quad 10 \quad 2' \quad 6'' \\
 \quad \underline{10 \quad 2' \quad 6''}
 \end{array}$$

( 8 )

$$\begin{array}{r}
 158cu. yd. \quad 17cu.ft. \quad 4' \\
 \underline{27} \\
 42ft. \quad 10')4283cu.ft. \quad 4'(100sq.ft. \\
 \underline{4283} \quad 4' \\
 12ft. \quad 6')100ft. \quad 0'(8ft. \quad Ans. \\
 \quad 100 \quad 0'
 \end{array}$$

## DECIMAL FRACTIONS.

(1)	(2)	(3)
.06. <i>Ans.</i>	1.7. <i>Ans.</i>	.005. <i>Ans.</i>

(4)	(5)	(6)
.27. <i>Ans.</i>	.047. <i>Ans.</i>	6.41. <i>Ans.</i>

(7)	(8)	(9)	(10)
7.008. <i>Ans.</i>	9.05. <i>Ans.</i>	11.50. <i>Ans.</i>	44.7. <i>Ans.</i>

(1)	(2)	(3)
27.4. <i>Ans.</i>	36.015. <i>Ans.</i>	99.0027. <i>Ans.</i>

(4)	(5)	(6)
.320. <i>Ans.</i>	200.000320. <i>Ans.</i>	.3610 <i>Ans.</i>

(7)	(8)	(9)
5.000003. <i>Ans.</i>	40.0000009. <i>Ans.</i>	.4900. <i>Ans.</i>

(10)	(11)	(12)
59.0067. <i>Ans.</i>	.0469. <i>Ans.</i>	79.000415. <i>Ans.</i>

(13)	(14)
67.0227. <i>Ans.</i>	105.0000095. <i>Ans.</i>

(1)	(2)	(3)	(4)
\$37.265. <i>A.</i>	\$17.005. <i>A.</i>	\$215.08. <i>A.</i>	\$275.005. <i>A.</i>

(5)	(6)	(7)
\$9.008. <i>Ans.</i>	\$15.069. <i>Ans.</i>	\$27.182. <i>Ans.</i>

## ADDITION OF DECIMALS.

( 1 ) 1306.1805. <i>Ans.</i>	( 2 ) 528.697893. <i>Ans.</i>	( 3 ) 159.37. <i>Ans.</i>
( 4 ) 1.5415. <i>Ans.</i>	( 5 ) 446.0924. <i>Ans.</i>	( 6 ) 27.2087. <i>Ans.</i>
( 7 ) 88.76257. <i>Ans.</i>	( 8 ) 71.010. <i>Ans.</i>	( 9 ) 1835.599. <i>Ans.</i>
( 10 ) 397.547. <i>Ans.</i>	( 11 ) 31.02464. <i>Ans.</i>	( 12 ) 1.110129. <i>Ans.</i>
( 13 ) 204.0278277. <i>Ans.</i>	( 14 ) 400.33269960. <i>Ans.</i>	( 15 ) .1008879. <i>Ans.</i>
( 16 ) \$85.463. <i>Ans.</i>	( 17 ) \$1065.19. <i>Ans.</i>	( 18 ) 3.8896 tons. <i>Ans.</i>
( 19 ) \$427.835. <i>Ans.</i>	( 20 ) \$19.215. <i>Ans.</i>	( 21 ) \$670.975. <i>Ans.</i>
( 22 ) \$30.286. <i>Ans.</i>		

## SUBTRACTION OF DECIMALS.

( 1 ) 3278. .0879 ----- 3277.9121. <i>Ans.</i>	( 2 ) 291.10001 41.496 ----- 249.60401. <i>Ans.</i>	( 3 ) 10.00001 .111111 ----- 9.888890. <i>Ans.</i>
--	---	--

( 4 )

57.49

5.768

51.722. *Ans.*

( 5 )

3.075

.3054

2.7696. *Ans.*

( 6 )

1745.3

173.45

1571.85. *Ans.*

( 7 )

.7

.0054

.6946. *Ans.*

( 8 )

1.00075.

.105

.89575. *Ans.*

( 9 )

754.355.

150.43

603.925 *Ans.*

( 10 )

1754.754

375.49478

1379.25922. *A.*

( 11 )

175.01

75.304

99.706. *Ans.*

( 12 )

35.49

17.541

17.949. *Ans.*

( 13 )

.7

.000007

.699993. *Ans.*

( 14 )

396.

67.0008

328.9992. *Ans.*

( 15 )

1.

.001

.999. *Ans.*

( 16 )

6374.

59.1

6314.9. *Ans.*

( 17 )

365.0075

.000005

365.007495. *A.*

( 18 )

21.004

.0098

20.9942. *A.*

( 19 )

260.3609

.0000047

260.3608953. *Ans.*

( 20 )

10.0302

.000019

10.030181. *A.*

( 21 )

2.03

.0006

2.0294. *Ans.*

( 22 )

1000.

.001

999.999. *Ans.*

( 23 )	( 24 )	( 25 )
2500.	200.027	1.
.25	97.0120	.5768
<u>2499.75.</u> <i>Ans.</i>	<u>103.0150.</u> <i>Ans.</i>	<u>.4232.</u> <i>Ans.</i>

( 26 )	( 27 )
127.25	700.
84.125	617.375
116.7	<u>\$ 82.625.</u> <i>Ans.</i>
<u>328.075</u>	
	500.
	328.075
	<u>171.925</u> acres. <i>Ans.</i>

( 28 )	( 29 )
325.50	225.025
97.125	98.18306
60.875	<u>126.84194</u> tons. <i>Ans.</i>
<u>\$483.500</u>	
	510.10
	483.50
	<u>\$26.60.</u> <i>Ans.</i>

( 30 )	( 31 )
1240.06	1284.05
1867.985	1284.05
<u>3108.045</u>	2568.10
2346.865	<u>786.375</u>
<u>\$ 761.180</u> <i>Ans.</i>	<u>1781.725</u> lbs. <i>Ans.</i>

## MULTIPLICATION OF DECIMALS.

( 1 )	( 2 )	( 3 )
.796875. <i>Ans.</i>	.263872. <i>Ans.</i>	.0000500. <i>Ans.</i>

( 4 )	( 5 )	( 6 )
1.50050. <i>Ans.</i>	26.99178. <i>Ans.</i>	10376.283913. <i>A.</i>

( 7 )	( 8 )	( 9 )
275539.5065. <i>A.</i>	.0206211250. <i>A.</i>	28033.797099. <i>A.</i>

(10)	(11)	(12)
175.26788356. <i>A.</i>	.000432045770. <i>A.</i>	216.94165850. <i>A.</i>

(13)	(14)	(15)
.000000000294. <i>A.</i>	18616.74. <i>A.</i>	933.8253150762. <i>A.</i>

(16)	(17)	(18)
.00715248. <i>A.</i>	.608785264. <i>A.</i>	.02860992. <i>A.</i>

(19)	(20)	(21)
2.435141056. <i>Ans.</i>	1296. <i>Ans.</i>	312.5. <i>Ans.</i>

(22)	(23)	(24)
.375. <i>Ans.</i>	.0036. <i>Ans.</i>	148.28125 acres. <i>A.</i>

(25)	(26)	(27)
12.13035 feet. <i>Ans.</i>	\$24.0625. <i>A.</i>	\$3192.005625. <i>A.</i>

(28)	(29)	(30)
\$210.03125. <i>A.</i>	\$708.901875. <i>A.</i>	\$2.06525 gain. <i>A.</i>

(2)	(3)
258.13007. <i>Ans.</i>	162.526. <i>Ans.</i>

(4)	(5)
2757.89786. <i>Ans.</i>	3566163. <i>Ans.</i>

## DIVISION OF DECIMALS.

(1)	(2)	(3)
2.22. <i>Ans.</i>	8.522. <i>Ans.</i>	33.331. <i>Ans.</i>

(4)	(5)	(6)
1.0001. <i>Ans.</i>	12420.5. <i>Ans.</i>	.005. <i>Ans.</i>

$$\begin{array}{l} (7) \\ 4.25. \text{ Ans.} \end{array}$$

$$\begin{array}{l} (8) \\ .007. \text{ Ans.} \end{array}$$

$$\begin{array}{l} (9) \\ .75. \text{ Ans.} \end{array}$$

$$\begin{array}{l} (10) \\ 1.27. \text{ Ans.} \end{array}$$

$$\begin{array}{l} (11) \\ .015. \text{ Ans.} \end{array}$$

$$\begin{array}{l} (12) \\ 17.008. \text{ Ans.} \end{array}$$

$$\begin{array}{l} (13) \\ 25.05068 \\ 250.5068 \\ 2505.068 \\ 25050.68 \\ 250506.8 \end{array}$$

$$\begin{array}{l} (14) \\ 48.65961 \\ 4865.961 \\ 48659.61 \\ 486596.1 \\ 4865961. \end{array}$$

$$\begin{array}{l} (15) \\ 41.622 \\ 416.22 \\ 4162.2 \\ 41622. \\ 416220. \\ 4162200. \end{array}$$

$$\begin{array}{l} (16) \\ 254.7347748 \\ 25473.47748 \\ 254734.7748 \\ 2547347.748 \\ 25473477.48 \\ 254734774.8 \end{array}$$

$$\begin{array}{l} (17) \\ .13956463+. \text{ A.} \end{array}$$

$$\begin{array}{l} (18) \\ 1918.515+. \text{ A.} \end{array}$$

$$\begin{array}{l} (19) \\ .004735. \text{ A.} \end{array}$$

$$\begin{array}{l} (20) \\ 174.412+. \text{ A.} \end{array}$$

$$\begin{array}{l} (21) \\ 69.7125. \text{ A.} \end{array}$$

$$\begin{array}{l} (22) \\ 1.36832+. \text{ A.} \end{array}$$

$$\begin{array}{l} (23) \\ 12976.81+. \text{ A.} \end{array}$$

$$\begin{array}{l} (24) \\ .004958+. \text{ Ans.} \end{array}$$

$$\begin{array}{l} (25) \\ 154.125 \div 25 = 6.165 \text{ cu. yds. A.} \end{array}$$

$$\begin{array}{l} (26) \\ \$167.875 \div 17 = \$9.875. \text{ A.} \end{array}$$

$$\begin{array}{l} (27) \\ \$97.223 \div 45.22 = \$2.15. \text{ A} \end{array}$$

$$\begin{array}{l} (28) \\ \$232.655 \div 375.25 = \$0.62. \text{ A.} \end{array}$$

$$\begin{array}{l} (29) \\ \$2.25 \div .125 = 18 \text{ lbs. A.} \end{array}$$

$$\begin{array}{l} (30) \\ 34 \div 4.25 = 8 \text{ suits. A.} \end{array}$$

$$\begin{array}{l} (31) \\ 366.52 \div 26.18 = 14 \text{ days. A.} \end{array}$$

$$\begin{array}{l} (32) \\ \$2.225 + \$0.985 + \$1.168 = \$4.378 ; 242.979 \div 4.378 \\ = 55.5 \text{ bushels. Ans.} \end{array}$$



( 33 )

269 acres ; \$13573.204 cost of the whole ;  $\$13573.204 \div 269$   
 $= \$50.458$  + average price per acre.

( 34 )

$4379.837 \times 6 = \$26279.022$ ;  $8345 + 26279.022 = \$34624.022$   
 value of whole property ;  $\$3976.48 + 120 = \$4096.48$  amount  
 of debts ;  $34624.022 - 4096.48 = \$30527.542$  ;  $30527.542 \div 4$   
 $= \$7631.8855$  the eldest son's share ;  $30527.542 - 7631.8855$   
 $= \$22895.6565$  ;  $\$22895.6565 \div 4 = \$5723.914125$  each of the  
 other sons' shares.

( 2 )

( 3 )

( 4 )

( 5 )

10970. *Ans.*60200. *Ans.*1000. *Ans.*100. *Ans.*

( 6 )

10 ; 100 ; 1000 ; 30 ; 20 ; 2000 ; 12 ; 1200 ; 500000.

( 3 )

( 4 )

( 5 )

( 6 )

8.311+. *A.*1.563+. *A.*1.1604+. *A.*16.119+. *A.*

( 2 )

( 3 )

79.1188. *Ans.*35.2843. *Ans.*

( 4 )

( 5 )

11.5834036. *Ans.*3202.8870. *Ans.*

## REDUCTION OF DECIMALS.

( 1 )

( 2 )

.25 ; .5 ; .75. *Ans.*.8 ; .875 ; .3125. *Ans.*

( 3 )

( 4 )

.375 ; .04. *Ans.*.015625 ; .2666+. *Ans.*

( 5 )

.125; .003. *Ans.*

( 6 )

.2571+; .4411+. *Ans.*

( 7 )

.23903+. *Ans.*

( 8 )

.07157+. *Ans.*

( 9 )

.4375; .078125. *Ans.*

( 10 )

.00448. *Ans.*

( 11 )

.536; .372. *Ans.*

( 12 )

.9. *Ans.*

( 13 )

.7333+. *Ans.*

( 14 )

.48375. *Ans.*

( 15 )

.5128+. *Ans.*

( 16 )

.5375; .005606+. *Ans.*

( 17 )

.1666+. *A.*

( 18 )

 $\frac{1}{2}$  of  $\frac{2}{3}$  of  $\frac{7}{8} \div \frac{3}{8}$  of  $\frac{1}{4} = \frac{14}{9} = 1.555+$ . *A.*

( 19 )

 $\frac{4}{32}$  of  $\frac{7}{8} = \frac{7}{44} = .15909+$ . *Ans.*

( 20 )

 $\frac{1}{30}$  of  $87\frac{3}{4} = 32$  bush.;  $\frac{9}{20}$  of  $7 = \$\frac{63}{20}$ ;  $\frac{63}{20} \times 32 = \$100.80$ . *A.*

( 21 )

 $\frac{8}{5} + 7\frac{1}{2} + 8\frac{3}{4} = \frac{357}{20} = \$17.85$ . *Ans.*

( 22 )

 $\frac{5}{4}$  of  $18 + \frac{8}{11}$  of  $1\frac{1}{2} + 7\frac{1}{3} = \frac{1492}{5} = 30.611+$ . *Ans.*

( 23 )

 $\frac{3}{5}$  of  $8\frac{3}{4} - \frac{2}{3}$  of  $3\frac{1}{2} = 2\frac{1}{12} = 2.9166+$ . *Ans.*

( 24 )

 $\frac{16}{21} + \frac{13}{7} + \frac{2}{3} = \frac{179}{63} = 2.8412+$ . *Ans.*

(1)

$$.25 = \frac{1}{4}; .75 = \frac{3}{4}. \text{ Ans.}$$

(2)

$$.125 = \frac{1}{8}; .625 = \frac{5}{8}. \text{ Ans.}$$

(3)

$$105 = \frac{21}{200}; .0025 = \frac{1}{400}. \text{ A.}$$

(4)

$$.8015 = \frac{1603}{2000}; .6042 = \frac{3021}{5000}.$$

(5)

$$.68375 = \frac{547}{800}. \text{ Ans.}$$

(6)

$$.01875 = \frac{3}{160}. \text{ Ans.}$$

(7)

$$.22575 = \frac{903}{4000}. \text{ Ans.}$$

(8)

$$.265625 = \frac{17}{64}. \text{ Ans.}$$

(1)

$$14dr. \div 16 = .875oz.; .875 \div 16 = .0546875lb. \text{ Ans.}$$

(2)

$$78d. \div 12 = 6.5s.; 6.5 \div 20 = £.325. \text{ Ans.}$$

(3)

$$63pt. \div 2 = 31.5qt.; 31.5 \div 8 = 3.9375pk. \text{ Ans.}$$

(4)

$$9hr. \div 24 = .375da. \text{ Ans.}$$

(5)

$$375678ft. \div 16\frac{1}{2} = 22768.363rd. +; 22768.363 \div 320 \\ = 71.1511mi. +. \text{ Ans.}$$

(6)

$$19pwt. \div 20 = .95oz.; 7.95 \div 12 = .6625lb. \text{ Ans.}$$

(7)

$$8oz. \div 16 = .5lb.; 7.5 \div 25 = .3qr.; .3 \div 4 = .075cwt.; \\ 3.075 \div 20 = .15375T. \text{ Ans.}$$

( 8 )

$$2.45s. \div 20 = £.1225. \text{ Ans.}$$

( 9 )

$$1.047R. \div 4 = .26175A. \text{ Ans.}$$

( 10 )

$$176.9yd. \div 5\frac{1}{2} = 32.16363rd. + ; 32.16363 \div 40 = .80409 fur. +$$

$$.80409 \div 8 = .100511mi. \text{ Ans.}$$

( 11 )

$$14lb. \div 25 = .56qr. ; 2.56 \div 4 = .64cwt. \text{ Ans.}$$

( 12 )

$$16gr. \div 24 = .66666pwt. + ; 18.66666 \div 20 = .933333oz. + ;$$

$$10.933333 \div 12 = .911111lb. \text{ Ans.}$$

( 13 )

$$2na. \div 4 = .5qr. ; 3.5 \div 4 = .875yd. \text{ Ans.}$$

( 14 )

$$1gal. \div 63 = .01587.hhd. +. \text{ Ans.}$$

( 15 )

$$43sec. \div 60 = .716666m. + ; 6.716666 \div 60 = .1119444hr. ;$$

$$17.1119444 \div 24 = .7129975da. \text{ Ans.}$$

( 16 )

$$2.6qr. \div 4 = .65cwt. ; 4.65 \div 20 = .2325 T. \text{ Ans.}$$

( 17 )

$$2far. \div 4 = .5d. ; 5.5 \div 12 = .45833s. ; 19.45833 \div 20$$

$$= £.97291 +. \text{ Ans.}$$

( 18 )

$$37P. \div 40 = .925R. ; 1.925 \div 4 = .48125A. \text{ Ans.}$$

( 19 )

$$3na. \div 4 = .75qr. ; 2.75 \div 5 = .55 E. E. \text{ Ans.}$$

( 20 )

$$\begin{aligned}
 6.5 \text{ in.} \div 12 &= .541666 + ft.; \quad 2.541666 \div 3 = .847222 \text{ yd.}; \\
 2.847222 \text{ yd.} \div 5\frac{1}{2} &= .5176767 \text{ rd.} +; \quad 5176767 \div 40 \\
 &= .0129419 \text{ fur.}; \quad .0129419 \div 8 = .0016177 \text{ mi.}
 \end{aligned}$$

( 21 )

$$22.5'' \div 60 = .375'; \quad 15.375' \div 60 = .25625^\circ. \quad \text{Ans.}$$

( 22 )

$$290 \text{ c. in.} \div 1728 = .167824 + ft.; \quad .167824 \div 40 = .0041956 \text{ ton.}$$

( 23 )

$$3 \text{ pk.} \div 4 = .75 \text{ bu.}; \quad 3.75 \div 36 = .10416 \text{ chal.} \quad \text{Ans.}$$

( 24 )

$$\begin{aligned}
 6 \text{ in.} \div 12 &= .5 \text{ ft.}; \quad 1.5 \div 3 = .5 \text{ yd.}; \quad 17.5 \div 5\frac{1}{2} = 3.181818 \text{ rd.}; \\
 3.181818 \div 40 &= .07954545 \text{ fur.}; \quad .07954545 \div 8 \\
 &= .00994318 \text{ mi.} \quad \text{Ans.}
 \end{aligned}$$

( 25 )

$$9.5 \text{ mo.} \div 12 = .791666 + \text{yr.} \quad \text{Ans.}$$

( 26 )

$$\begin{aligned}
 16 \text{ gr.} \div 24 &= .6666 \text{ pwt.}; \quad 18.6666 \div 20 = .9333 \text{ oz.}; \\
 10.9333 \div 12 &= .9111 \text{ lb.} \quad \text{Ans.}
 \end{aligned}$$

( 27 )

$$14 \text{ P.} \div 40 = .35 \text{ R.}; \quad 1.35 \text{ R.} \div 4 = .3375 \text{ A.} \quad \text{Ans.}$$

( 28 )

$$45 \text{ pk.} \div 4 = 11.25 \text{ bu.}; \quad 11.25 \div 36 = .3125 \text{ chal.} \quad \text{Ans.}$$

( 29 )

$$\begin{aligned}
 72 \text{ yd.} \div 5\frac{1}{2} &= 13.090 \text{ rd.}; \quad 13.0909 \div 40 = .32727 \text{ fur.}; \\
 .32727 \div 8 &= .0409 \text{ mi.} \quad \text{Ans.}
 \end{aligned}$$

( 30 )

$$9 \div 24 = .375; 375 \div 20 = .01875 \text{ ream. } \textit{Ans.}$$

( 31 )

$$4.0125 \text{ in.} \div 12 = .334375 \text{ ft.}; .334375 \div 16 \frac{1}{2} = .020265 \text{ rd. } \textit{Ans.}$$

( 32 )

$$10 \text{ wk.} + 2 \text{ da.} = 72 \text{ da.}; 72 \div 366 = .19672 \text{ yr.} + \textit{Ans.}$$

( 33 )

$$10 \text{ gr.} \div 20 = .5 \text{ D}; 1.5 \div 3 = .5 \text{ S}; 1.5 \div 8 = .1875 \text{ } \frac{3}{8}; \\ 4.1875 \div 12 = .3489 \text{ B. } \textit{Ans.}$$

( 34 )

$$1.75 \text{ pt.} \div 2 = .875 \text{ qt.}; 3.875 \div 4 = .96875 \text{ gal.}; .96875 \div 63 \\ = .01537 + \text{ hhd. } \textit{Ans.}$$

( 35 )

$$1.8 \text{ sq. ft.} \div 9 = .2 \text{ sq. yd.}; 24.2 \div 30 \frac{1}{4} = .8 \text{ P.}; .8 \div 40 = .02 \text{ R.}; \\ .02 \div 4 = .005 \text{ A. } \textit{Ans.}$$

( 36 )

$$36 \text{ in.} \div 2 \frac{1}{4} = .16 \text{ na.}; 1.16 \div 4 = .29 \text{ qr.}; 2.29 \div 4 = .5725 \text{ yd.}$$

( 37 )

$$3''' \div 12 = .25''; 8.25'' \div 12 = .6875'; 4.6875 \div 12 = .390625 \text{ ft.}; \\ 3.390625 \text{ ft. } \textit{Ans.}$$

( 1 )

$$8725 \text{ cwt.} \times 4 = 2.69 \text{ qr.}; .69 \times 25 = 17.25 \text{ lb.}; .25 \times 16 = 4 \text{ oz.}; \\ 2 \text{ qr. } 17 \text{ lb. } 4 \text{ oz. } \textit{Ans.}$$

( 2 )

$$61 \text{ pt.} \times 2 = 1.22 \text{ hhd.}; 22 \times 63 = 13.86 \text{ gal.}; .86 \times 4 = 3.44 \text{ qt.}; \\ 1 \text{ hhd. } 13 \text{ gal. } 3.44 \text{ qt. } \textit{Ans.}$$

( 3 )

$$\begin{aligned} \text{£.83229} \times 20 &= 16.64583 ; .64580 \times 12 = 7.7496d. ; .7496 \times 4 \\ &= 2.99 + far. ; 16s. 7d. 2.99far. \quad \text{Ans.} \end{aligned}$$

( 4 )

$$.0625bar. \times 36 = 2.25gal. ; .25 \times 4 = 1qt. ; 2gal. 1qt. \quad \text{Ans.}$$

( 5 )

$$\begin{aligned} .42857mo. \times 4 &= 1.71428wk. ; .71428 \times 7 = 4.99996da. ; \\ .99996 \times 24 &= 23.99904hr. ; .99904 \times 60 = 59.9424m. ; \\ .9424 \times 60 &= 56.5 + sec. ; \\ 1wk. 4da. 23hr. 59m. 56.5sec. \quad \text{Ans.} \end{aligned}$$

( 6 )

$$.05A. \times 4 = .20R. ; .20 \times 40 = 8P. \quad \text{Ans.}$$

( 7 )

$$.3375T. \times 20 = 6.75cwt. ; .75 \times 4 = 3qr. ; 6cwt. 3qr. \quad \text{Ans.}$$

( 8 )

$$\begin{aligned} .875pi. \times 2 &= 1.75hhd. ; .75 \times 63 = 47.25gal. ; .25 \times 4 = 1qt. ; \\ 1hhd. 47gal. 1qt. \quad \text{Ans.} \end{aligned}$$

( 9 )

$$.375hhd. \times 54 = 20.25gal. ; .25 \times 4 = 1qt. ; 20gal. 1qt. \quad \text{Ans.}$$

( 10 )

$$\begin{aligned} .911111lb. \times 12 &= 10.933332oz. ; .933332 \times 20 = 18.66664pwt. ; \\ .66664 \times 24 &= 15.99 + gr. ; 10oz. 18pwt. 15.99gr. \quad \text{Ans.} \end{aligned}$$

( 11 )

$$.675E. \times 5 = 3.375qr. ; .375 \times 4 = 1.5na. ; 3qr. 1.5na. \quad \text{A.}$$

( 12 )

$$\begin{aligned} .001136 \times 8 \times 40 \times 16\frac{1}{2} &= 5.99808ft. ; .99808 \times 12 = 11.9 + in. \\ &= 5ft. 11.9 + in. \quad \text{Ans.} \end{aligned}$$

( 13 )

$$\begin{aligned} .000242 \times 640 \times 4 \times 40 &= 24.78008 P.; \quad 78008 \times 30\frac{1}{2} \\ &= 23.6192 sq. yd.; \quad 6192 \times 9 = 5.5728 sq. ft.; \quad .5728 \times 144 \\ &= 82.4832 sq. in.; \quad 24 P. 23 sq. yd. 5 sq. ft. 82.4832 sq. in. \end{aligned}$$

( 14 )

$$\begin{aligned} .4629 Deg. \times 69\frac{1}{2} &= 32.17155 mi.; \quad .17155 mi. \times 8 = 1.3724 fur.; \\ .3724 fur. \times 40 &= 14.896 rd.; \quad .896 rd. \times 16\frac{1}{2} = 14.784 ft.; \\ .784 ft. \times 12 &= 9.408 in.; \quad 32 mi. 1 fur. 14 rd. 14 ft. 9.408 in. \end{aligned}$$

( 15 )

$$.875 yd. \times 3 = 2.625 ft.; \quad .625 \times 12 = 7.5 in.; \quad 2 ft. 7.5 in. \quad Ans.$$

( 16 )

$$\begin{aligned} .3489 \text{ lb} \times 12 &= 4.1868 \text{ } \frac{3}{4}; \quad .1868 \times 8 = 1.4944 \text{ } \frac{3}{4}; \quad .4944 \times 3 \\ &= 1.4832 \text{ } \frac{3}{4}; \quad .4832 \times 20 = 9.6 gr. +; \quad 4 \text{ } \frac{3}{4} \text{ } 1 \text{ } \frac{3}{4} \text{ } 1 \text{ } \frac{3}{4} \text{ } 9.6 gr. \quad Ans. \end{aligned}$$

( 17 )

$$\begin{aligned} .759 A. \times 4 &= 3.036 R.; \quad .036 \times 40 = 1.44 P.; \quad .44 \times 30\frac{1}{2} \\ &= 13.31 sq. yd.; \quad 3 R. 1 P. 13.31 sq. yd. \quad Ans. \end{aligned}$$

( 18 )

$$.01875 \times 20 = .375 \text{ quires}; \quad .375 \times 24 = 9. \text{ sheets. } Ans.$$

( 19 )

$$.0055 T. \times 20 = .11 cwt.; \quad .11 \times 4 = .44 qr.; \quad .44 \times 25 = 11 lb. \quad A.$$

( 20 )

$$.625 s. \times 12 = 7.5 d.; \quad .5 \times 4 = 2 far.; \quad 7 d. 2 far. \quad Ans.$$

( 21 )

$$.3375 A. \times 4 = 1.35 R.; \quad .35 \times 40 = 14 P.; \quad 1 R. 14 P. \quad Ans.$$

( 22 )

$$\begin{aligned} .785 yr. \times 365\frac{1}{4} &= 286.72125 da.; \quad .72125 \times 24 = 17.31 hr. \\ .31 \times 60 &= 18 m. 36 sec.; \quad 286 da. 17 hr. 18 m. 36 sec. \quad Ans. \end{aligned}$$



## CIRCULATING DECIMALS.

$$\begin{array}{ccc} (1) & (2) & (3) \\ \frac{2}{150} = .06. \text{ A.} & \frac{13}{140} = .09285+. \text{ A.} & \frac{11}{320} = .034375. \text{ A.} \end{array}$$

$$\begin{array}{ccc} (4) & (5) & (6) \\ \frac{17}{1380} = .01328125. \text{ A.} & \frac{11}{370} = .029729+. \text{ A.} & \frac{17}{500} = .034. \text{ A.} \end{array}$$

$$\begin{array}{ccc} (7) & & (8) \\ \frac{7}{28} = .028. \text{ Ans.} & & \frac{31}{20} = .043055+. \text{ Ans.} \end{array}$$

$$(3) \\ .6 = \frac{2}{3}; .162' = \frac{6}{37}; .769230' = \frac{10}{13}; .945' = \frac{35}{37}; .09' = \frac{1}{11}.$$

$$(4) \\ .594405' = \frac{66045}{111111} = \frac{85}{143}; .36' = \frac{4}{11}; .142857' = \frac{5291}{37037} = \frac{1}{7}.$$

$$(4) \\ .13'8 = \frac{5}{8}; 7.5'43' = 7\frac{43}{93}; .04'354' = \frac{29}{888}; 37.5'4' = 37\frac{4}{66}; \\ .6'75' = \frac{223}{330}; .7'54347' = \frac{754347}{999999}. \text{ Ans.}$$

$$(5) \\ .7'5' = \frac{34}{45}; .4'38' = \frac{217}{495}; .09'3' = \frac{7}{75}; 4.7'513' = 4\frac{258}{885}; \\ .009'87' = \frac{163}{18500}; .4'5 = \frac{41}{90}. \text{ Ans.}$$

$$(2) \\ \frac{210}{1120} = .1875'. \text{ Ans.}$$

$$(3) \\ \frac{4}{1180} = .00344827586206896551724137931'. \text{ Ans.}$$

$$(4) \\ \frac{12}{125} = .09756'; \frac{80}{133} = .592'; \frac{72}{135} = .53. \text{ Ans.}$$

(2)	(1)	(2)
2.4181818'	165.16'416416'	.5'333333'
.5'925925'	.04'040404'	.4'757575'
.008'497133'	03'777777'	1.7'577577'

## ADDITION AND SUBTRACTION OF CIRCULATING DECIMALS.

(2)	(3)
95.2'829647'. <i>Ans.</i>	69.74'203112'. <i>Ans.</i>

(4)	(5)
55.6'209780437503'. <i>Ans.</i>	47.3'763490'. <i>Ans.</i>

(6)
416.2'542876' +. <i>Ans.</i>

(2)	(3)	(4)
45.7'757'. <i>Ans.</i>	2.9'957'. <i>Ans.</i>	5.09. <i>Ans.</i>

(5)	(6)	(7)
.65'370016280907'. <i>A.</i>	4.37'4. <i>Ans.</i>	4.619'525'. <i>Ans.</i>

(8)	(9)
1.0923'7. <i>Ans.</i>	1.3462'937'. <i>Ans.</i>

## MULTIPLICATION OF CIRCULATING DECIMALS.

(2)	(3)	(4)
5.53780'5. <i>Ans.</i>	1.093'086'. <i>Ans.</i>	1.6411'7. <i>Ans.</i>

(5)	(6)	(7)
1.7183'39'. <i>Ans.</i>	1.4710'037'. <i>Ans.</i>	6.1'656'. <i>Ans.</i>

(8)	(9)
11.'068735402'. <i>Ans.</i>	.81654'168350'. <i>Ans.</i>



## RATIO AND PROPORTION.

$$\begin{array}{ll} (1) & (2) \\ (10 \times 10) \div 5 = 38. & \text{Ans.} \quad (14 \times 24) \div 6 = 56. \text{ Ans.} \end{array}$$

$$\begin{array}{ll} (3) & (4) \\ (16 \times 9) \div 12 = 12. & \text{Ans.} \quad (16 \times 20) \div 8 = 40. \text{ Ans.} \end{array}$$

$$(5) \\ (48 \times 90) \div 45 = 96. \text{ Ans.}$$

$$\begin{array}{lll} (2) & (3) & (4) \\ \frac{4}{8} = \frac{1}{2}. & \text{Ans.} \quad \frac{5}{10} = \frac{1}{2}. & \text{Ans.} \quad \frac{17}{34} = \frac{1}{2}. \text{ Ans.} \end{array}$$

$$\begin{array}{lll} (5) & (6) & (7) \\ \frac{300}{450} = \frac{2}{3}. & \text{Ans.} \quad \frac{16}{96} = \frac{1}{6}. & \text{Ans.} \quad \frac{8}{12} = \frac{2}{3}. \text{ Ans.} \end{array}$$

$$\begin{array}{ll} (8) & (9) \\ \frac{16}{48} = \frac{1}{3}. & \text{Ans.} \quad \frac{18}{90} = \frac{1}{5}. \text{ Ans.} \end{array}$$

$$\begin{array}{ll} (10) & (11) \\ \frac{15}{165} = \frac{1}{11}. & \text{Ans.} \quad \frac{9}{99}. \text{ Ans.} \end{array}$$

$$\begin{array}{ll} (1) & (2) \\ 8 : 110 :: \$24 : x. & 2 : 12 :: 15 : x. \end{array}$$

$$\begin{array}{r|l} \$ & 110 \ 3 \\ x & 24 \ 3 \\ \hline & \$330. \text{ Ans.} \end{array}$$

$$\begin{array}{r|l} 2 & 15 \ 6 \\ x & 12 \ 6 \\ \hline & \$90. \text{ Ans.} \end{array}$$

$$\begin{array}{ll} (3) & (4) \\ 6 : 18 :: 168 : x. & 8 : 13 :: \$1,28 : x. \end{array}$$

$$\begin{array}{r|l} \$ & 168 \ 3 \\ x & 18 \ 3 \\ \hline & 504 \text{ miles. Ans.} \end{array}$$

$$\begin{array}{r|l} \$ & 1,28 \ 16 \\ x & 13 \\ \hline & \$2,08. \text{ Ans.} \end{array}$$

(5)

$$300 : 125 :: \$2100 : x.$$

$$\begin{array}{r|l} \$00 & 2100^7 \\ x & 125 \\ \hline & \$875. \text{ Ans.} \end{array}$$

(6)

$$120 : 36 :: 330 : x.$$

$$\begin{array}{r|l} 120 & 330^3 \\ x & 36 \\ \hline & 99 \text{ pounds. Ans.} \end{array}$$

(7)

$$80 : 650 : \$340 : x.$$

$$\begin{array}{r|l} 80 & 340^{17} \\ x & 650 \\ \hline 4 & 11050,00 \\ \hline & \$2762,50. \text{ Ans.} \end{array}$$

(8)

$$1 : 400 :: 5 : x.$$

$$\begin{array}{r|l} 1 & 5 \\ x & 400 \\ \hline & \$20,00. \text{ Ans.} \end{array}$$

(9)

$$6 \text{ gal.} : 6 \text{ hhd.} :: \$1,95 : x.$$

$$\begin{array}{r|l} \$ & 1,95^{63} \\ x & 278 \\ \hline & \$122,85. \text{ Ans.} \end{array}$$

(10)

$$16 : 40 :: 560 : x.$$

$$\begin{array}{r|l} 16 & 560^{35} \\ x & 40 \\ \hline & 1400 \text{ lbs. Ans.} \end{array}$$

(11)

$$12 : 314 :: 630 : x.$$

$$\begin{array}{r|l} 12 & 630^{105} \\ x & 314^{157} \\ \hline & 16485. \text{ Ans.} \end{array}$$

(12)

$$2 : (3 \times 25) :: \$3,25 : x.$$

$$\begin{array}{r|l} 2 & 3,25 \\ x & 75 \\ \hline 2 & 243,75 \\ \hline & \$121,87\frac{1}{2}. \text{ Ans.} \end{array}$$

(13)

$$3 : 36 :: 18 : x.$$

$$\begin{array}{r|l} \$ & 18^6 \\ x & 36 \\ \hline & 216 \text{ shillings. A.} \end{array}$$

(14)

$$8 \text{ s. } 4 \text{ d.} : 7 \text{ s. } 6 \text{ d.} :: 8 : x.$$

$$\begin{array}{r|l} 10 & 100^9 \\ x & 8 \\ \hline 10 & 72 \\ \hline & 7\frac{1}{2} \text{ ounces. A.} \end{array}$$

( 15 )

$$5A. 1R. 16P. : 125A. 2R. 20P. :: \$150,5 : x.$$

$$\begin{array}{r|l} 214 & 5025 \\ \hline 214 & 758262,5 \\ \hline \end{array} \quad \begin{array}{l} 20100 \\ 150,5 \\ \$3533,936+. \end{array} \quad \text{Ans.}$$

( 16 )

$$13cwt. 2qr. : 9cwt. :: \$129,93 : x.$$

$$\begin{array}{r|l} 34 & 43,81 \\ \hline 34 & 86,62. \end{array} \quad \begin{array}{l} 2 \\ 129,93 \\ \$86,62. \end{array} \quad \text{Ans.}$$

( 17 )

$$750 : 10500 :: £2834 5s. : x.$$

$$\begin{array}{r|l} 140 & 14 \\ \hline 20 & 793590 \\ \hline 20 & £39679,10s. \end{array} \quad \begin{array}{l} 56685 \\ 105000 \\ \end{array} \quad \text{Ans.}$$

( 18 )

$$3yd. 2qr. : 8yd. 3qr. :: \$15,75 : x.$$

$$\begin{array}{r|l} 14 & 15,75 \\ \hline 2 & 78,75 \\ \hline \end{array} \quad \begin{array}{l} 5 \\ 15,75 \\ \$39,37\frac{1}{2}. \end{array} \quad \text{Ans.}$$

( 19 )

$$.5 : .95 :: \$201,5 : x.$$

$$\begin{array}{r|l} 201,5 & 1.9 \\ \hline .5 & .95 \\ \hline \end{array} \quad \begin{array}{l} 1.9 \\ .95 \\ \$382,85. \end{array} \quad \text{Ans.}$$

( 20 )

$$3.5 : 26.25 :: \$8,40 : x.$$

$$\begin{array}{r|l} 8,40 & 1.68 \\ \hline 3.5 & 37.5 \\ \hline \end{array} \quad \begin{array}{l} 1.68 \\ 37.5 \\ \$63. \end{array} \quad \text{Ans.}$$

(21)

$$2.5 \text{ tons} : 1 \text{ cwt.} :: \$1,80 : x.$$

$$\begin{array}{r|l} 5 & 1,80,18 \\ \hline 5 & ,18 = \$0,036 \end{array} \text{ Ans.}$$

(22)

$$\frac{3}{4} : \frac{1}{8} :: \$2,16 : x.$$

$$\begin{array}{r|l} & 2,16,09 \\ \hline & 7 \\ x & 4 \\ \hline & \$2,52. \end{array} \text{ Ans.}$$

(23)

$$\frac{1}{4} \text{ oz.} : 1\frac{1}{2} \text{ oz.} :: \frac{1}{12} : x.$$

$$\begin{array}{r|l} 4 & 12 \\ \hline 2 & 3 \\ 5 & 7 \\ x & \\ \hline 40 & 77,00 \\ \hline & \$1,925. \end{array} \text{ Ans.}$$

(24)

$$14\frac{2}{3} \text{ lb.} : 16\frac{1}{2} \text{ lb.} :: \$1\frac{5}{8} : x.$$

$$\begin{array}{r|l} 2 & 11 \\ \hline 5 & 21 \\ \hline 10 & 21 \\ \hline & \$2,10. \end{array} \text{ Ans.}$$

(25)

$$14\frac{1}{2} \text{ yd.} : 39\frac{3}{4} :: \$19\frac{1}{2} : x.$$

$$\begin{array}{r|l} 2 & 105 \\ \hline 2 & 2 \\ x & \\ \hline 2 & 105 \\ \hline & \$52,50. \end{array} \text{ Ans.}$$

(26)

$$\frac{1}{8} \text{ bar.} : \frac{1}{11} \text{ bar.} :: \$\frac{9}{11} : x.$$

$$\begin{array}{r|l} 7 & 9 \\ \hline 14 & 4 \\ \hline 49 & 36 = \frac{36}{14}. \end{array} \text{ Ans.}$$

(27)

$$\frac{3}{18} : \frac{1}{12} :: \$2880 : x.$$

$$\begin{array}{r|l} 2 & 1440 \\ \hline 3 & 5 \\ \hline x & \\ \hline & \$7200. \end{array} \text{ Ans.}$$

(28)

$$462 \text{ yd.} : 116\frac{1}{4} \text{ yd.} :: \$150,66 : x.$$

$$\begin{array}{r|l} 154 & 150,66 \\ \hline 4 & 155 \\ \hline x & \\ \hline 616 & 23352.3 \\ \hline & \$37,909+. \end{array} \text{ Ans.}$$

$$(29) \quad 7\frac{7}{11} \text{ bar.} : 32\frac{2}{5} \text{ bar.} :: \$31\frac{1}{4} : x. \quad \$1,93\frac{3}{4} : \$96\frac{7}{8} :: 2 \text{ bu. } 1 \text{ pk.} : x.$$

$$\begin{array}{r|l} 4 & 125^{25} \\ 14 & 102^{27} \\ 14 & 11 \\ \hline 56 & 7425 \\ \hline & \$132,589. \text{ Ans.} \end{array}$$

$$\begin{array}{r|l} 8 & 9^{100} \\ 8 & 11^{100} \\ 11 & 11 \\ \hline x & 1 \\ \hline 8 & 900 \\ \hline & 112\frac{1}{2} \text{ bu. Ans.} \end{array}$$

$$(31) \quad \frac{1}{2} \text{ yd.} : 7\frac{1}{2} \text{ yd.} :: \$1\frac{1}{2} : x. \quad (32) \quad 47.5 \text{ yd.} : 37.05 \text{ yd.} :: \$72,25 : x.$$

$$\begin{array}{r|l} 3 & 14 \\ 2 & 15^4 \\ 5 & 5^4 \\ \hline x & \\ \hline 3 & 56 \\ \hline & \$18,66\frac{2}{3}. \text{ Ans.} \end{array}$$

$$\begin{array}{r|l} 11.5 & 19.5 \\ x & 2.89 \\ \hline & \$56,355. \text{ Ans.} \end{array}$$

$$(33) \quad 3 : 160 :: 2 : x.$$

$$(34) \quad \frac{1}{2} \text{ g.} : £21 :: 1 \text{ wk.} : x.$$

$$\begin{array}{r|l} 3 & 160 \\ x & 2 \\ \hline 3 & 320 \\ \hline & 106\frac{2}{3} \text{ yds. Ans.} \end{array}$$

$$\frac{1}{2} \text{ g.} = 10\frac{1}{2} \text{ s.} \quad \begin{array}{r|l} 21 & 20 \\ x & 2 \\ \hline & 40 \text{ weeks. Ans.} \end{array}$$

$$(35) \quad 12 \text{ doz.} : 297 :: \$54,72 : x. \quad (36) \quad 9000 : 13500 :: \$3618 : x.$$

$$\begin{array}{r|l} 144 & 54,72^{38} \\ x & 297 \\ \hline & \$112,86. \text{ Ans.} \end{array}$$

$$\begin{array}{r|l} 9000 & 13500^{27} \\ x & 3618^{201} \\ \hline & \$5427. \text{ A.} \end{array}$$

(37)

The rum at 80 cts. a gallon, costs - - \$50,40  
 The rum at 60 cts. a gallon, costs - - \$37,80

Leaving a difference of - - - - \$12,60 which must  
 be made up by water, also at 60 cts. a gallon: How much  
 water is required?

$$60 \text{ cts.} : \$12,60 :: 1 \text{ gal.} : x.$$

$$\begin{array}{r|l} 60 & 12,60^{21} \\ x & 21 \text{ gal.} \end{array}$$



( 38 )

$$\$1 : \$3570 :: ,60 : x.$$

$$\$1 : \$1875 :: ,60 : x.$$

1	3570	1	1875
x	,60	x	,60
\$2142		\$1125	

A.
B.

( 39 )

$$\$3726 : \$1 :: \$2328,75.$$

46	\$726	2328,75	28,75
x		1	
46		28,75	
		,62½	

Ans.

( 40 )

$$90 : 7 :: 80 : x.$$

90	80
x	7
9	
56	
6⅔	

bottles. Ans.

( 41 )

$$4\frac{5}{7}yd. : 40\frac{2}{3}yd. :: 14s. 8d. : x.$$

\$	44
5	68
3	204
x	7
15	
1904	
126½	

shil. Ans

( 42 )

$$14\frac{3}{4}oz. : 154\frac{7}{8}lb. :: 1lb. : x.$$

50	2478
x	42
4	
168	

pounds. Ans.

( 43 )

$$1gal. : 100gal. :: 1\frac{1}{2}pt. : x,$$

100	50
2	15
750	

pts. = 93¾ gal.

( 44 )

$$23-19=4 \text{ miles gain.}$$

$$4 : 96 :: 23 : x.$$

23	24
x	96
552	

mi. Ans.

( 45 )

$$\frac{3}{4} \text{ of } \frac{1}{2} = \frac{1}{4}.$$

$$\frac{1}{4} : 1 :: \$9345 : x.$$

\$9345	623
1	1
1	28
\$17444	

Ans.

( 46 )

The minute hand-goes 12 times as fast as the hour hand; hence, it *gains* 11 minute spaces while the hour hand moves over one. At six, the hour hand is 30 spaces ahead: how far does it move before it is overtaken?

Spaces.	Spaces.	Spaces.	Spaces
11	30	1	x.
	11	1	
	x	30	
	11	30	$= 2\frac{2}{11}$ spaces.
Time, 6 o'clock			32m. 43 $\frac{7}{11}$ sec.

( 47 )

( 48 )

7 : 196 :: 5 : x. 4 + 5 = 9 miles, what they approach in 1 hour.

$$\begin{array}{r|l} 7 & 196 \\ x & 5 \\ \hline & 140 \text{ feet. } \textit{Ans.} \end{array}$$

9mi. : 279mi. :: 1hr. : x.

$$\begin{array}{r|l} 9 & 279 \\ x & 1 \\ \hline & 31 \text{ hrs., time they meet.} \end{array}$$

$5 \times 31 = 155$  miles A travelled.

$4 \times 31 = 121$  miles B travelled.

( 49 )

$\frac{1}{3} + \frac{1}{4} + \frac{1}{6} = \frac{9}{12}$ , what all will do in 1 day.

$$\begin{array}{r|l} \frac{9}{12} & 1 \\ x & 1 \\ \hline & 4 = 1\frac{1}{4} \text{ days.} \end{array}$$

( 50 )

$\frac{1}{9} - \frac{1}{15} = \frac{2}{45}$ , what C can do alone in 1 day.

$\frac{2}{45} : 1 :: 1 \text{ da.} : x.$

$$\begin{array}{r|l} 2 & 45 \\ x & 1 \\ \hline 2 & 45 \\ \hline & 22\frac{1}{2} \text{ days. } \textit{Ans.} \end{array}$$

( 51 )

$8 + 7 = 15$ , the whole number of hands at work ; therefore A is to receive pay for 8, and B for 7 men : hence,

$$15 : 8 :: 165,75 : x = \$88,40 \text{ A's.}$$

$$15 : 7 :: 165,75 : x = \$77,35 \text{ B's.}$$

( 52 )

From 12 o'clock Monday to 10hr. 15m. on Saturday is 4da. 22hr. 15m.

1da. : 4da. 22hr. 15m. : : 3m. 10sec. :  $x = 15m. 36\frac{7}{8}sec.$  gain,  
to which add the 10 minutes  $= 25m. 36\frac{7}{8}sec.$  ;

10hr. 15m.

25m.  $36\frac{7}{8}sec.$ 


---

 10hr. 40m.  $36\frac{7}{8}sec.$  Ans.

( 53 )

$10m. + 7\frac{1}{2}m. = 17\frac{1}{2}m.$  difference in 24 hours. Time from Tuesday 12 o'clock to Friday morning 6 o'clock, is 2da. 18hr.

$$24hr. : 2da. 18hr. : : 17\frac{1}{2}m. : x = 48m. 7\frac{1}{2}sec. \text{ Ans.}$$

( 54 )

6 boys = 3 men.

$$15 : 8 :: \$46,25 : x.$$

$$\begin{array}{r} 3 \\ 1\cancel{\$} \overline{) 46,25} \end{array} \begin{array}{l} 9.25 \\ 8 \end{array}$$

$$\begin{array}{r} 3 \overline{) 74,00} \\ x = \$24,66\frac{2}{3}. \text{ Ans.} \end{array}$$

( 55 )

B travels  $11\frac{1}{3}$  yards per minute, and gains upon A,  $\frac{1}{3}$  of a yard ;  $536 \div 2 = 268$  yards, the whole distance to be gained.

$\frac{1}{3} : 268 : : 11 : x = 8844$  yards that A must travel to be overtaken by B.  $8844 \div 536 = 16\frac{1}{2}$  that he must travel around the wood.

## INVERSE PROPORTION.

$$(1) \quad \left. \begin{array}{l} 3\frac{3}{4} \\ 1\frac{1}{2} \end{array} \right\} : x \left\} :: 1 : 1.$$

$$\begin{array}{r|l} 15^3 & \\ 2 & 3 \\ 5 & 5 \\ x & \end{array}$$

$x=9$  yards. *Ans.*

$$(2) \quad \left. \begin{array}{l} 16\frac{1}{2} \\ 3\frac{1}{2} \end{array} \right\} : x \left\} :: 1 : 1.$$

$$\begin{array}{r|l} 2 & 76 \\ 5 & 84 \\ 7 & \\ x & \end{array}$$

$x=8\frac{2}{3}$  rods. *Ans.*

$$(3) \quad \left. \begin{array}{l} 36 \text{ ft.} = 12 \text{ yd.} \\ 30 \text{ ft.} = 10 \text{ yd.} \end{array} \right\} : x \left\} :: 1 : 1.$$

$$\begin{array}{r|l} 12^4 & \\ 10 & 10 \\ x & 4 \end{array}$$

$x=160$  yards. *Ans.*

$$(4) \quad \left. \begin{array}{l} 8 \\ 9 \end{array} \right\} : x \left\} :: 1 : 1.$$

$$\begin{array}{r|l} 5 & 4 \\ 10 & 9 \\ x & 36 \end{array}$$

$x=7\frac{1}{5}$  days. *Ans.*

$$(5) \quad \left. \begin{array}{l} 15 \\ 8 \end{array} \right\} : x \left\} :: 1 : 1.$$

$$\begin{array}{r|l} 15^5 & \\ 8 & 5 \\ x & \end{array}$$

$x=5$

$15-5=10.$  *Ans.*

$$(6) \quad \left. \begin{array}{l} 4600 \\ 6 \end{array} \right\} : x \left\} :: 1 : 1.$$

$$\begin{array}{r|l} 4600^{920} & \\ 6 & 920 \\ x & \end{array}$$

$x=920.$  *Ans.*

$$(7) \quad \left. \begin{array}{l} 9000 \\ 90 \end{array} \right\} : 15000 \left\} : x \left\} :: 1 : 1.$$

$$\begin{array}{r|l} 15000^6 & \\ 90 & 6 \\ x & \end{array}$$

$x=54$  days. *Ans.*

$$(8) \quad \left. \begin{array}{l} 7\frac{1}{2} \\ 330 \end{array} \right\} : 11 \left\} : x \left\} :: 1 : 1.$$

$$\begin{array}{r|l} 2 & 1515 \\ 11 & 330 \\ x & \end{array}$$

$x=225$  days. *Ans.*

( 9 )

$(4000 \times 14) \div 16 = 3500 \text{ lbs.}$ , amount of bread consumed in 1 day ;  $3500 \times 168 = 588000$  pounds, amount consumed in 24 weeks ;  $210 \times 200 = 42000$  pounds, the amount spoiled ;  $588000 - 42000 = 546000$  pounds remained.

$$588000 : 546000 :: 14\text{oz.} : x = 13\text{oz.} \quad \text{Ans.}$$

( 10 )

$13\text{oz.} : 14\text{oz.} :: 546000\text{lb.} : x = 588000\text{lb.}$  weight of the whole.

$14\text{oz.} : 13\text{oz.} :: 588000\text{lb.} : x = 546000\text{lb.}$  received.

( 11 )

$13\text{oz.}$  to each man per day  $= 546000\text{lb.} = \frac{1}{4}$  of the whole.

$$13 : 14 :: 546000 : x = 588000\text{lb.}$$

$$546000 : 588000 :: 13 : x = 14\text{oz.}$$

( 12 )

$$\frac{4}{80} \left\{ : \frac{16}{x} \right\} :: 1 : 1.$$

$$\begin{array}{r|l} 16 & 4 \\ x & 80 \end{array} \quad \begin{array}{l} 5 \\ \hline x = 20 \text{ days.} \end{array} \quad \text{Ans.}$$

( 13 )

$$\frac{21}{18} \left\{ : \frac{7}{x} \right\} :: 1 : 1.$$

$$\begin{array}{r|l} 7 & 21^3 \\ x & 18 \end{array} \quad \begin{array}{l} \\ \hline x = 54 \text{ days.} \end{array} \quad \text{Ans.}$$

( 14 )

$$\frac{20}{6} \left\{ : \frac{10}{x} \right\} :: 1 : 1.$$

$$\begin{array}{r|l} 10 & 20^2 \\ x & 6 \end{array} \quad \begin{array}{l} \\ \hline x = 12 \text{ days.} \end{array} \quad \text{Ans.}$$

( 15 )

$$\frac{10}{12} \left\{ : \frac{20}{x} \right\} :: 1 : 1.$$

$$\begin{array}{r|l} 20 & 10^6 \\ x & 12 \end{array} \quad \begin{array}{l} \\ \hline x = 6 \text{ days.} \end{array} \quad \text{Ans.}$$

$$(16)$$

$$\left. \begin{array}{l} 100 \\ 120 \end{array} \right\} : \left. \begin{array}{l} 75 \\ x \end{array} \right\} :: 90 : 90.$$

$$\begin{array}{r|l} 90 & 100^4 \\ 75 & 120^{40} \\ \hline x & 90 \end{array}$$

$$x = 160 \text{ days. } \textit{Ans.}$$

$$(17)$$

$$\left. \begin{array}{l} 35,5 \\ 13,566 \end{array} \right\} : \left. \begin{array}{l} x \\ 11,9 \end{array} \right\} :: 1 : 1.$$

$$\begin{array}{r|l} 11.9 & 35.5 \\ x & 13.566^{1,14} \\ \hline x & 40.47 \text{ days. } \textit{Ans.} \end{array}$$

$$(18)$$

$$\left. \begin{array}{l} 50 \\ 12 \end{array} \right\} : \left. \begin{array}{l} 5 \\ x \end{array} \right\} :: 600 : 600.$$

$$\begin{array}{r|l} 600 & 50 \\ 5 & 12 \\ \hline x & 12 \end{array}$$

$$x = 10 \text{ years. } \textit{Ans.}$$

$$(19)$$

$$\left. \begin{array}{l} 12 \\ 4 \end{array} \right\} : \left. \begin{array}{l} x \\ 9 \end{array} \right\} :: 1 : 1.$$

$$\begin{array}{r|l} 9 & 12^4 \\ x & 4 \\ \hline 3x & 16 \end{array}$$

$$x = 5\frac{1}{3} \text{ days. } \textit{Ans.}$$

$$(20)$$

$$\left. \begin{array}{l} 120 \\ 15\frac{1}{4} \end{array} \right\} : \left. \begin{array}{l} x \\ 40\frac{1}{2} \end{array} \right\} :: \frac{1}{2} : \frac{1}{2}.$$

$$\begin{array}{r|l} 41 & 120^{15} \\ 122 & 61 \\ 2 & 3 \\ x & 2 \end{array}$$

$$x = 45 \text{ men. } \textit{Ans.}$$

$$(21)$$

$$\left. \begin{array}{l} 3600 \\ 34 \\ 24 \end{array} \right\} : \left. \begin{array}{l} 4800 \\ 45 \\ x \end{array} \right\} :: 1 : 1.$$

$$\begin{array}{r|l} 5 & 4800 \\ 45 & 34^2 \\ x & 24 \\ \hline 5 & 68 \end{array}$$

$$x = 13\frac{3}{5} \text{ oz. } \textit{Ans.}$$

$$(22)$$

$$1 \text{ colt} = \frac{3}{5} \text{ horse; } 7 \text{ horses and } 3 \text{ colts} = 8\frac{4}{5} \text{ horses.}$$

$$\left. \begin{array}{l} 3 \\ 40 \end{array} \right\} : \left. \begin{array}{l} 8\frac{4}{5} \\ x \end{array} \right\} :: 1 : 1.$$

$$\begin{array}{r|l} 11 & 5 \\ 44 & 10 \\ x & 3 \\ \hline 11 & 150 \end{array}$$

$$x = 13\frac{7}{11} \text{ days. } \textit{Ans.}$$

(23)

$$\left. \begin{array}{l} 24 \\ 10\frac{1}{4} \end{array} \right\} : \left. \begin{array}{l} x \\ 12\frac{1}{4} \end{array} \right\} :: 1 : 1.$$

$$\begin{array}{r|l} 7 & 4\cancel{0} & 4^2 \\ & x & 24^3 \\ & \cancel{2} & \cancel{2}1 \\ \hline & 7 & 144 \\ \hline & x & = 20\frac{1}{4} \text{ days. } \textit{Ans.} \end{array}$$

(24)

$$\left. \begin{array}{l} 40 \\ 4 \end{array} \right\} : \left. \begin{array}{l} x \\ 15 \end{array} \right\} :: 1 : 1.$$

$$\begin{array}{r|l} 3 & 1\cancel{5} & 4\cancel{0}^8 \\ & x & 4 \\ & \cancel{3} & \cancel{3}2 \\ \hline & x & = 10\frac{2}{3} \text{ rods. } \textit{Ans.} \end{array}$$

(25)

$$\left. \begin{array}{l} 12 \\ 10 \end{array} \right\} : \left. \begin{array}{l} x \\ 9 \end{array} \right\} :: \frac{1}{2} : \frac{1}{2}.$$

$$\begin{array}{r|l} 3 & \cancel{0} & 1\cancel{2}^4 \\ & x & 10 \\ & \cancel{2} & \cancel{2} \\ \hline & 3 & 40 \\ \hline & x & = 13\frac{1}{3} \text{ days. } \textit{Ans.} \end{array}$$

(26)

$$\left. \begin{array}{l} 100 \\ 450 \\ 36 \end{array} \right\} : \left. \begin{array}{l} 100 \\ x \\ 20 \end{array} \right\} :: 1 : 1.$$

$$\begin{array}{r|l} & 1\cancel{0}\cancel{0} & 1\cancel{0}\cancel{0} \\ & x & 450^9 \\ & \cancel{5} & \cancel{3}6 \\ \hline & 5 & 4050 \\ \hline & x & = 810 \text{ lbs. } \textit{Ans.} \end{array}$$

(27)

$$\left. \begin{array}{l} 20 \\ 12 \\ 9 \end{array} \right\} : \left. \begin{array}{l} x \\ 6 \\ 10 \end{array} \right\} :: 1 : 1.$$

$$\begin{array}{r|l} & 1\cancel{0} & 2\cancel{0}^4 \\ & \cancel{6} & 1\cancel{2} \\ & x & 9 \\ \hline & x & = 36 \text{ men. } \textit{Ans.} \end{array}$$

(28)

$$\left. \begin{array}{l} 72 \\ 7\frac{1}{2} \end{array} \right\} : \left. \begin{array}{l} x \\ 90 \end{array} \right\} :: 1 : 1.$$

$$\begin{array}{r|l} & \cancel{9}\cancel{0} & 7\cancel{2}^6 \\ & x & 1\cancel{5} \\ & \cancel{2} & \\ \hline & x & = 6 \text{ horses. } \textit{Ans.} \end{array}$$

(29)

$$\left. \begin{array}{l} 5000 \\ 15 \\ 2\frac{1}{2} \end{array} \right\} : \left. \begin{array}{l} x \\ 12\frac{1}{2} \\ 1\frac{3}{4} \end{array} \right\} :: 1 : 1.$$

$$\begin{array}{r|l} & \cancel{5}\cancel{0}\cancel{0}\cancel{0} & 1000 \\ & & 15 \\ & \cancel{2} & \cancel{5} \\ & \cancel{2}\cancel{5} & \cancel{2} \\ & 7 & 4 \\ \hline & 7 & 60000 \\ \hline & x & = 8571\frac{3}{7} \text{ planks. } \textit{Ans.} \end{array}$$

(30)

$$\left. \begin{array}{l} 12 \\ 18 \\ 3 \end{array} \right\} : \left. \begin{array}{l} 9 \\ 24 \\ x \end{array} \right\} :: 1 : 1.$$

$$\begin{array}{r|l} & \cancel{9} & 1\cancel{2} \\ & \cancel{2}4 & 1\cancel{8} \\ & x & 3 \\ \hline & x & = 3 \text{ hours. } \textit{Ans.} \end{array}$$

## COMPOUND PROPORTION.

(1)

$$\left. \begin{matrix} 2 \\ 75 \end{matrix} \right\} : \left. \begin{matrix} 18 \\ x \end{matrix} \right\} :: 125 : 243.$$

$$\begin{array}{r|l} 5 & 125 \\ 125 & 243 \\ x & 75 \\ \hline 5 & 81 \\ \hline x & 16\frac{1}{3} \end{array} \begin{array}{l} 81 \\ \\ \\ \end{array}$$

$x = 16\frac{1}{3}$  days. *Ans.*

(2)

$$\left. \begin{matrix} 400 \\ 12 \end{matrix} \right\} : \left. \begin{matrix} x \\ 2 \end{matrix} \right\} :: 5 : 15.$$

$$\begin{array}{r|l} 5 & 400 \\ 2 & 15 \\ x & 12 \\ \hline x & 7200 \text{ men. } A. \end{array}$$

(3)

$$\left. \begin{matrix} 12 \\ 8 \end{matrix} \right\} : \left. \begin{matrix} 15 \\ 10 \end{matrix} \right\} :: 120 : x.$$

$$\begin{array}{r|l} 2 & 12 \\ 8 & 15 \\ x & 10 \\ \hline 2 & 375 \\ \hline x & 187\frac{1}{2} \end{array} \begin{array}{l} 5 \\ 5 \\ 5 \\ \end{array}$$

$x = 187\frac{1}{2}$  miles. *Ans.*

(4)

$$\left. \begin{matrix} 6 \\ 4 \end{matrix} \right\} : \left. \begin{matrix} 12 \\ 9 \end{matrix} \right\} :: 16 : x.$$

$$\begin{array}{r|l} 6 & 16 \\ 4 & 12 \\ x & 9 \\ \hline x & 72 \text{ acres. } Ans. \end{array}$$

(5)

$$\left. \begin{matrix} 24 \\ 40 \end{matrix} \right\} : \left. \begin{matrix} 48 \\ x \end{matrix} \right\} :: 60 : 30.$$

$$\begin{array}{r|l} 60 & 40 \\ 40 & 30 \\ x & 24 \\ \hline x & 10 \text{ days. } A. \end{array} \begin{array}{l} 10 \\ \\ \\ \end{array}$$

(6)

$$\left. \begin{matrix} 82 \\ 4 \end{matrix} \right\} : \left. \begin{matrix} 48 \\ x \end{matrix} \right\} :: \begin{matrix} 36 & 864 \\ 8 & 6 \\ 4 & 3 \end{matrix}$$

$$\begin{array}{r|l} 4 & 36 \\ 8 & 864 \\ 4 & 6 \\ x & 3 \\ \hline 4 & 369 \\ \hline x & 92\frac{1}{2} \end{array} \begin{array}{l} 3 \\ 41 \\ 41 \\ \end{array}$$

$x = 92\frac{1}{2}$  days. *Ans.*



$$\begin{array}{l} 80 \\ 3\frac{1}{2} \\ 150 \end{array} \left. \vphantom{\begin{array}{l} 80 \\ 3\frac{1}{2} \\ 150 \end{array}} \right\} : 12 \left. \vphantom{\begin{array}{l} 80 \\ 3\frac{1}{2} \\ 150 \end{array}} \right\} : : 84 : x.$$

$$\begin{array}{r|l} 80 & 30 \\ 150 & 12 \\ x & 84 \\ \hline 1 & 2 \end{array}$$

$$x = \$36. \text{ Ans.}$$

$$\begin{array}{l} 6 \\ 1 \end{array} \left. \vphantom{\begin{array}{l} 6 \\ 1 \end{array}} \right\} : 12.5 \left. \vphantom{\begin{array}{l} 6 \\ 1 \end{array}} \right\} : : 15.6 : x.$$

$$\begin{array}{r|l} 6 & 15.6 \\ 1 & 12.5 \\ x & 9 \\ \hline x & 292.5 \text{ gallons.} \end{array}$$

$$\begin{array}{l} 12 \\ 7 \end{array} \left. \vphantom{\begin{array}{l} 12 \\ 7 \end{array}} \right\} : 19 \left. \vphantom{\begin{array}{l} 12 \\ 7 \end{array}} \right\} : : 14 : 494.$$

$$\begin{array}{r|l} 12 & 14 \\ 7 & 19 \\ x & 494 \\ \hline 1 & 2 \end{array}$$

$$x = 156 \text{ tailors. Ans.}$$

$$\begin{array}{l} 3600 \\ 35 \\ 24 \end{array} \left. \vphantom{\begin{array}{l} 3600 \\ 35 \\ 24 \end{array}} \right\} : 45 \left. \vphantom{\begin{array}{l} 3600 \\ 35 \\ 24 \end{array}} \right\} : : 1 : 2.$$

$$\begin{array}{r|l} 3600 & 45 \\ 35 & 14 \\ 24 & 1 \\ x & 2 \\ \hline x & 9600 \text{ men. A.} \end{array}$$

$$\begin{array}{l} 100 \\ 2s. 6d. \end{array} \left. \vphantom{\begin{array}{l} 100 \\ 2s. 6d. \end{array}} \right\} : 1s. 9d. \left. \vphantom{\begin{array}{l} 100 \\ 2s. 6d. \end{array}} \right\} : : £20 : £7.$$

$$\begin{array}{r|l} 100 & 10 \\ 21 & 30 \\ x & 100 \\ \hline 1 & 5 \end{array}$$

$$x = 50 \text{ men. Ans.}$$

$$\begin{array}{l} 13 \\ 7\frac{1}{2} \end{array} \left. \vphantom{\begin{array}{l} 13 \\ 7\frac{1}{2} \end{array}} \right\} : 20 \left. \vphantom{\begin{array}{l} 13 \\ 7\frac{1}{2} \end{array}} \right\} : : \$149.76 : x.$$

$$\begin{array}{r|l} 13 & 149.76 \\ 15 & 2 \\ x & 20 \\ \hline 1 & 4 \end{array}$$

$$x = \$471.04. \text{ Ans.}$$

$$\begin{array}{l} 6\frac{3}{4} \\ 12\frac{1}{2} \end{array} \left. \vphantom{\begin{array}{l} 6\frac{3}{4} \\ 12\frac{1}{2} \end{array}} \right\} : 10\frac{1}{2} \left. \vphantom{\begin{array}{l} 6\frac{3}{4} \\ 12\frac{1}{2} \end{array}} \right\} : : 264 : 129\frac{3}{4}.$$

$$\begin{array}{r|l} 6\frac{3}{4} & 264 \\ 12\frac{1}{2} & 129\frac{3}{4} \\ x & 10\frac{1}{2} \\ \hline 16 & 63 \end{array}$$

$$x = 31\frac{5}{8} \text{ days. Ans.}$$

$$\begin{array}{l} 120 \\ 12 \end{array} \left. \vphantom{\begin{array}{l} 120 \\ 12 \end{array}} \right\} : 9 \left. \vphantom{\begin{array}{l} 120 \\ 12 \end{array}} \right\} : : 30yd. \left. \vphantom{\begin{array}{l} 30yd. \end{array}} \right\} 50yd. \\ 12 \left. \vphantom{\begin{array}{l} 12 \end{array}} \right\} : 15 \left. \vphantom{\begin{array}{l} 12 \end{array}} \right\} : : 2ft. \left. \vphantom{\begin{array}{l} 2ft. \end{array}} \right\} 6ft. \\ 12 \left. \vphantom{\begin{array}{l} 12 \end{array}} \right\} : 15 \left. \vphantom{\begin{array}{l} 12 \end{array}} \right\} : : 4\frac{1}{2}ft. \left. \vphantom{\begin{array}{l} 4\frac{1}{2}ft. \end{array}} \right\} 4\frac{1}{2}ft.$$

$$\begin{array}{r|l} 120 & 30 \\ 12 & 2 \\ x & 50 \\ \hline 12 & 6 \\ 12 & 3 \\ x & 4\frac{1}{2} \end{array}$$

$$x = 180. \text{ Ans.}$$



( 21 )

$$\left. \begin{array}{l} 3 \\ 5 \\ 10 \end{array} \right\} : x \left\} : : 150 : 192 \right. \\ \left. \begin{array}{l} 4 \\ 12 \end{array} \right\} : : 240 : 300$$

150	\$00	.
240	192	
12	10	
4	5	
x	\$	
x = 5 men.		Ans.

( 22 )

$$\left. \begin{array}{l} 248 \\ 5\frac{1}{2} \\ 11 \end{array} \right\} : x \left\} : : 24 \right. \\ \left. \begin{array}{l} 7 \\ 3\frac{2}{3} \\ 2\frac{1}{3} \end{array} \right\} : : 337\frac{1}{2}$$

\$00	7	.
465	2	
11	3	
7	3	
24	x	
x = 5 men.		Ans.

## PARTNERSHIP.

( 1 )

$$7500 : 2500 : : 3000 : x = \$1000 \text{ A's.}$$

$$7500 : 3000 : : 3000 : x = \$1200 \text{ B's.}$$

$$7500 : 2000 : : 3000 : x = \$ 800 \text{ C's.}$$

( 2 )

$$4200 : 3600 : : 2000 : x = \$1714,285\frac{5}{7} \text{ A's.}$$

$$4200 : 600 : : 2000 : x = \$ 285,714\frac{2}{7} \text{ B's.}$$

( 3 )

Since \$80 is to be paid out of the profits for expenses, the net profits will be \$15920.

$$40000 : 10000 : : 15920 : x = \$3980 ; 3980 + 50 = \$4030 \text{ A's.}$$

$$40000 : 10000 : : 15920 : x = \$ 3980 \text{ B's.}$$

$$40000 : 10000 : : 15920 : x = \$ 3980 \text{ C's.}$$

$$40000 : 10000 : : 15920 : x = \$3980 ; 3980 + 30 = \$4010 \text{ D's}$$

( 4 )

$$\begin{array}{ccccc} \text{A} & \text{B} & \text{C} & \text{D} & \text{E} \\ \frac{1}{4}, & \frac{1}{8}, & \frac{1}{6}, & \frac{1}{8}, & \frac{1}{3} = \frac{6}{24}, \frac{3}{24}, \frac{4}{24}, \frac{3}{24}, \frac{8}{24}. \end{array}$$

$$24 : 6 : 20000 : x = \$5000 \quad \text{A's.}$$

$$24 : 3 : 20000 : x = \$2500 \quad \text{B's.}$$

$$24 : 4 : 20000 : x = \$3333,33\frac{1}{3} \quad \text{C's.}$$

$$24 : 3 : 20000 : x = \$2500 \quad \text{D's.}$$

$$24 : 8 : 20000 : x = \$6666,66\frac{2}{3} \quad \text{E's.}$$

( 5 )

$$2200 : 500 : : 440 : x = 100 \quad \text{A's.}$$

$$2200 : 700 : : 440 : x = 140 \quad \text{B's.}$$

$$2200 : 1000 : : 440 : x = 200 \quad \text{C's.}$$

( 6 )

$$18000 : 5000 : : 12000 : x = \$3333,33\frac{1}{3} \quad \text{First.}$$

$$18000 : 4500 : : 12000 : x = \$3000 \quad \text{Second.}$$

$$18000 : 4500 : : 12000 : x = \$3000 \quad \text{Third.}$$

$$18000 : 4000 : : 12000 : x = \$2666,66\frac{2}{3} \quad \text{Fourth.}$$

( 7 )

As each son was to have but one half as much as the mother, so the surviving son will have but one part, while the mother will have two parts of the legacy, or the son will have  $\frac{1}{3}$  and the mother  $\frac{2}{3}$  of \$4500.

$$3 : 1 : 4500 : x = \$1500 \quad \text{the son's share.}$$

$$3 : 2 : 4500 : x = \$3000 \quad \text{the mother's share.}$$

( 8 )

A's gain + B's + C's = \$4320,50 + \$5245,75 + \$3600,75 = \$13167;  
 \$15000 - \$13167 = \$1833 = D's gain.

Since each share of the gain is to the whole gain as each share of the stock is to the whole stock, we have

1833 : 15000 : : 5499 : \$45000, the whole capital.

15000 : 4320,50 : : 45000 :  $x$  = \$12961,50 A's stock.

15000 : 5245,75 : : 45000 :  $x$  = \$15737,25 B's stock.

15000 : 3600,75 : : 45000 :  $x$  = \$10802,25 C's stock.

\$15000 - 13167 = \$1833 D's gain.

( 9 )

A owned  $\frac{3}{12}$ , B  $\frac{4}{12}$ , and C  $\frac{5}{12}$  of the mill; 4300 - 2500 = \$1800 the whole loss.

12 : 3 : 1800 :  $x$  = 450 A's loss.

12 : 4 : 1800 :  $x$  = 600 B's loss.

12 : 5 : 1800 :  $x$  = 750 C's loss.

( 10 )

5 + 7 + 8 = 20; then A must have  $\frac{5}{20}$ , B  $\frac{7}{20}$ , and C  $\frac{8}{20}$  of \$16970.

20 : 5 : 16970 :  $x$  = \$4242,50 A's stock.

20 : 7 : 16970 :  $x$  = \$5939,50 B's stock.

20 : 8 : 16970 :  $x$  = \$6788 C's stock.

C's stock, \$6788, is equal to the whole gain, and each must have the same part of the whole gain as of the whole stock.

20 : 5 : 6788 :  $x$  = \$1697 A's gain.

20 : 7 : 6788 :  $x$  = \$2375,80 B's gain.

20 : 8 : 6788 :  $x$  = \$2715,20 C's gain.

( 11 )

$$475,50 + 362,125 + 250,875 + 140 = \$1228,50.$$

$$1228,50 : 475,50 :: 614,25 : x = \$237,75 \quad \text{A's.}$$

$$1228,50 : 362,125 :: 614,25 : x = \$181,0625 \quad \text{B's.}$$

$$1228,50 : 250,875 :: 614,25 : x = \$125,4375 \quad \text{C's.}$$

$$1228,50 : 140 :: 614,25 : x = \$70, \quad \text{D's.}$$

( 12 )

$$,20 : \$1 :: 2544 : x = \$12720. \quad \text{Ans.}$$

( 13 )

$$\frac{3}{8}, \frac{4}{9}, \frac{1}{3}, \frac{7}{15} = \frac{27}{45}, \frac{20}{45}, \frac{15}{45}, \frac{21}{45}, \text{ which added, gives } \frac{83}{45}.$$

Then the four persons agreed to do 83 parts of work, of which A would do 27, B 20, C 15, and D 21, and each must therefore receive like parts of the amount paid.

$$83 : 27 :: 270 : x = \$87,831 + \quad \text{A's.}$$

$$83 : 20 :: 270 : x = \$65,060 + \quad \text{B's.}$$

$$83 : 15 :: 270 : x = \$48,795 + \quad \text{C's.}$$

$$83 : 21 :: 270 : x = \$68,313 + \quad \text{D's.}$$

( 14 )

The fractions  $\frac{1}{2}$ ,  $\frac{3}{5}$  and  $\frac{7}{10}$ , reduced to their least common denominator, are  $\frac{5}{10}$ ,  $\frac{6}{10}$  and  $\frac{7}{10}$ ; and hence, the sums are proportional to the whole numbers, 5, 6 and 7.

$5+6+7=18$ , smallest sum of proportional numbers.

But since the number which denotes each share is taken twice, eighteen denotes *twice* the number of shares; hence, the number of shares is denoted by 9.

Now, the sum of the 1st and 2d shares is 5, that of the 1st and 3d, 6, and that of the 2d and 3d, 7; therefore, the second share is greater by 1 than the first, and the third, 1 greater than the second; hence, the shares, taken in order, differ from each other by 1; and since their sum is 9, 2, 3, and 4 denote the respective shares.

$$9 : 2 :: 4569 : x = \$1015,33\frac{1}{3} \quad \text{the first.}$$

$$9 : 3 :: 4569 : x = \$1523, \quad \text{the second.}$$

$$9 : 4 :: 4569 : x = \$2030,66\frac{2}{3} \quad \text{the third.}$$

## COMPOUND PARTNERSHIP.

(1)

$$7 \times 3 = 21$$

$$9 \times 5 = 45$$

$$4 \times 6 = 24$$

$$\hline 90$$

$$90 : 21 :: 70,20 : x = \$16,38 \text{ A's.}$$

$$90 : 45 :: 70,20 : x = \$35,10 \text{ B's.}$$

$$90 : 24 :: 70,20 : x = \$18,72 \text{ C's.}$$

(2)

The profits are proportional to the amount put in by each partner, multiplied by the time : hence,

$$\left. \begin{array}{l} 10000 \\ 12 \end{array} \right\} : \left. \begin{array}{l} x \\ 8 \end{array} \right\} :: 3000 : 2100$$

Hence, B put in what was equivalent to \$10500; and  $10500 \div 1500 = \$7$ .

OPERATION.

3000	2100	700
$\frac{x}{8}$	10000	5
	12	3
		\$10500

(3)

$$23000 \times 2 = 46000$$

$$21200 \times 10 = 212000$$

$$\hline \text{A's } 258000$$

$$13500 \times 4 = 54000$$

$$3500 \times 5 = 17500$$

$$\hline \text{B's } 71500$$

$$\hline 329500$$

$$329500 : 258000 :: 8400 : x = \$6577,23\frac{43}{55} \text{ A's.}$$

$$329500 : 71500 :: 8400 : x = \$1822,76\frac{118}{55} \text{ B's.}$$

(4)

$$4000 \times 12 = 48000$$

$$3000 \times 15 = 45000$$

$$5000 \times 8 = 40000$$

$$\hline 133000$$

$$133000 : 48000 :: 798 : x = \$288 \text{ A's.}$$

$$133000 : 45000 :: 798 : x = \$270 \text{ B's.}$$

$$133000 : 40000 :: 798 : x = \$240 \text{ C's.}$$

( 5 )

If C's gain is  $\frac{1}{12}$  and E's  $\frac{6}{12}$  of the whole, then D's must be  $\frac{5}{12}$  of the whole; then E's share of the gain is to D's, as E's stock for the time it was in trade, is to D's stock for the time it was in trade, and the same for C's; hence,

$$\frac{6}{12} : \frac{5}{12} :: 756 \times 4 : x = 2520 ; 2520 \div 9 = \$280 \text{ D's stock.}$$

$$\frac{6}{12} : \frac{1}{12} :: 756 \times 4 : x = 504 ; 504 \div 3 = \$168 \text{ C's stock.}$$

( 6 )

$$\begin{array}{r} 40 \times 4 \times 6 = 960 \\ 30 \times 12 \times 6 = 2160 \\ 22 \times 110 \times 5 = 12100 \\ \hline 15220 \end{array}$$

$$15220 : 960 :: 20760 : x = \$1309,43\frac{377}{61} \text{ officers.}$$

$$15220 : 2160 :: 20760 : x = \$2946,22\frac{658}{61} \text{ midshipmen.}$$

$$15220 : 12100 :: 20760 : x = \$16504,334\frac{87}{61} \text{ sailors.}$$

( 7 )

$$\begin{array}{r} 3000 \times 9 = 27000 \\ 4000 \times 9 = 36000 \\ \hline \end{array}$$

63000 A's.

$$4000 \times 12 = 48000$$

$$4500 \times 3 = 13500$$

$$2500 \times 3 = 7500$$

69000 B's.

$$\$7333\frac{1}{3} \times 6 = 44000 \text{ C's.}$$

176000

$$176000 : 63000 :: 7400 : x = \$2648,86\frac{4}{11} \text{ A's.}$$

$$176000 : 69000 :: 7400 : x = \$2901,13\frac{7}{11} \text{ B's.}$$

$$176000 : 44000 :: 7400 : x = \$1850, \text{ C's.}$$

( 8 )

$$14 \times 12 = 168. \quad 693 : 168 :: 346,50 : x = \$84, \text{ A's.}$$

$$18 \times 10 = 180. \quad 693 : 168 :: 346,50 : x = \$90, \text{ B's.}$$

$$15 \times 11 = 165. \quad 693 : 168 :: 346,50 : x = \$82,50 \text{ C's.}$$

$$20 \times 9 = 180. \quad 693 : 180 :: 346,50 : x = \$90, \text{ D's.}$$

693



( 9 )

$$\begin{array}{rcl}
 6 \times 4 = 24 & \text{first grade} & 54 : 24 :: 27 : x = \$12 \text{ 1st grade.} \\
 12 \times 2 = 24 & \text{second " } & 54 : 24 :: 27 : x = \$12 \text{ 2d grade.} \\
 6 \times 1 = 6 & \text{third " } & 54 : 6 :: 27 : x = \$3 \text{ 3d grade.} \\
 \hline
 & 54 &
 \end{array}$$

$$12 \div 6 = \$2; 12 \div 12 = \$1; 3 \div 6 = 50 \text{ cts.}$$

( 10 )

If \$600 accrue from \$480 in 6 months, the gain, \$120, would be equal to  $\frac{1}{2}$  the stock, and in 12 months it would be twice as much, or  $\frac{1}{3}$  the stock; therefore, \$1200, B's stock and gain for 12 months, is  $\frac{2}{3}$  of his stock, from which we obtain \$800 for B's stock.

Then B's stock is to C's stock, as B's gain for 12 months is to C's gain for the same time, or

$$800 : 320 :: 400 : x = \$160 \text{ C's gain for 12 months.}$$

$$\$520 - \$320 = \$200, \text{ C's whole gain.}$$

$$160, \text{ gain for 12 mo. : } 200 \text{ entire gain : : } 12 \text{ mo. : } 15 \text{ mo.} \\ \text{C's time.}$$

## PERCENTAGE.

( 1 )

$$.095; .0875. \text{ Ans.}$$

( 2 )

$$.125; .09875. \text{ Ans.}$$

( 3 )

$$2.08; 3.75; .95. \text{ Ans.}$$

( 4 )

$$.6666\frac{2}{3}. \text{ Ans.}$$

( 2 )

$$1256 \times .0025 = \$3.14. \text{ Ans.}$$

( 3 )

$$956,50 \times .005 = \$4,7825. \text{ Ans.}$$

( 4 )

$$475 \times .0075 = 3.5625 \text{ yds. A.}$$

( 5 )

$$324.5 \times .00875 = 2.839375 \text{ cwt.}$$

( 6 )

$$125.25 \times .008 = 1.002 \text{ lb. Ans.}$$

( 7 )

$$750 \times .016 = 12 \text{ bush. Ans.}$$

( 8 )

$$2000 \times .045 = \$90. \text{ Ans.}$$

( 9 )

$$186 \times .09 = 16.74 \text{ miles. Ans.}$$

( 10 )

$$460 \times .10375 = 47.725 \text{ sheep.}$$

( 11 )

$$540 \times .051 = 27.54 \text{ tons.}$$

( 12 )

$$3465.75 \times .086\frac{2}{3} = \$300.365. \text{ A.}$$

( 13 )

$$126 \times .125 = 15.75 \text{ cows.}$$

( 14 )

$$320 \times .50 = 160 \text{ bales.}$$

( 15 )

$$1275 \times .375 = 478.125 \text{ yards.}$$

( 16 )

$$4573 \times .95 = \$4344.35. \text{ Ans}$$

( 17 )

$$2500 \times 1.05 = 2625 \text{ barrels.}$$

( 18 )

$$4537 \times 1.125 = \$5144.625. \text{ A.}$$

( 19 )

$$5000 \times 2.50 = \$12500. \text{ A.}$$

( 20 )

$$1267.875 \times 3.05 = \$3867.01875. \text{ Ans.}$$

( 21 )

$$3000 \times 5.00 = \$15000. \text{ Ans.}$$

( 22 )

$$1500 \times .075 = 112.50$$

$$1000 \times .0475 = 47.50$$

$$\underline{\hspace{1cm}} \$65.00 \text{ A.}$$

( 23 )

$$895 \times .17 = 152.15; 895 - 152.15 = 742.85 \text{ gallons.}$$

( 24 )

$$250 \times .18 = 45.; 250 - 45 = 205. \text{ boxes.}$$

( 25 )

$$20 + .37\frac{1}{2} = .57\frac{1}{2}; 1.00 - .57\frac{1}{2} = .42\frac{1}{2} = \text{per cent in bonds and mortgages.}$$

$$25000 \times .42\frac{1}{2} = \$10625, \text{ amount in bonds and mortgages.}$$

( 26 )

$$3250 \times .87\frac{1}{2} = \$2843.75 ; 3250. + 2843.75 = \$6093.75. \text{ Ans.}$$

( 27 )

$$.25 + .50 + .12\frac{1}{2} = .87\frac{1}{2} ; 1.00 - .87\frac{1}{2} = 12\frac{1}{2} ;$$

$$1572.75 \times .12\frac{1}{2} = \$196.59375. \text{ Ans.}$$

( 1 )

$$2 \div 10 = .20 \text{ Ans.}$$

( 2 )

$$4 \div 32 = .125. \text{ Ans.}$$

( 3 )

$$3 \div 40 = .075 \text{ Ans.}$$

4 )

$$17 \div 125 = .136. \text{ Ans.}$$

( 5 )

$$36 \div 144 = .25. \text{ Ans.}$$

( 6 )

$$84 \div 96 = .875. \text{ Ans.}$$

( 7 )

$$275 \div 440 = .625. \text{ Ans.}$$

( 8 )

$$3 \div 400 = .0075. \text{ Ans.}$$

( 9 )

$$11 \div 800 = .01375. \text{ Ans.}$$

( 10 )

$$104 \div 312 = .33\frac{1}{3}. \text{ Ans.}$$

( 11 )

$$121.875 \div 325 = .375. \text{ Ans}$$

( 12 )

$$56.25 \div 450 = .125. \text{ Ans.}$$

( 13 )

$$2500 \times .20 = \$500 \text{ for groceries ; } 1875 + 500 = \$2375 ;$$

$$2500 - 2375 = \$125 \text{ left ; } 125 \div 2500 = .05. \text{ Ans.}$$

( 14 )

$$\text{One lost, } \$562.50, \text{ or } \frac{562.50}{4500} = \frac{1}{8} = 12\frac{1}{2} \text{ per cent.}$$

$$\text{the other } \$405, \text{ or } \frac{405}{4500} = \frac{9}{100} = 9 \text{ per cent.}$$

$$\text{Difference of loss} = .125 - .09 = .035 = 3\frac{1}{2} \text{ per cent.}$$

( 15 )

$$5400 + 1350 = \$6750 ; 5400 - 540 = \$4860 ; 4860 \div 6750 = .72. \text{ Ans.}$$

( 1 )

$$248 \div 1.55 = \$160 ; 160 \div 40 = \$4 \text{ per head.}$$

( 2 )

$$6835.50 \div 1.26 = \$5425. \text{ Ans.}$$

( 3 )

$$1 - .37\frac{1}{2} = .62\frac{1}{2} ; 31250 \div .625 = \$50000. \text{ Ans.}$$

( 4 )

$$1 - .16 = .84 ; 4200 \div .84 = \$5000. \text{ Ans.}$$

## INTEREST.

( 2 )

$$871,25 \times .07 = \$60,9875. \text{ A}$$

( 3 )

$$535,50 \times .06 \times 7 = \$224,91$$

( 4 )

$$1125,885 \times .08 \times 4 = \$360,2832. \text{ Ans.}$$

( 5 )

$$789,74 \times .05 \times 12 = \$473,844. \text{ Ans.}$$

( 6 )

$$2500 \times .075 \times 7 = \$1312,50. \text{ Ans.}$$

( 7 )

$$3153,82 \times .045 \times 2 = \$283,8438. \text{ Ans.}$$

( 8 )

$$199,48 \times .07 \times 16 = \$223,4176 ; 199,48 + 223,4176 \\ = \$422,8976. \text{ Ans}$$

( 9 )

$$897,50 \times .06 \times 3 = \$215,40 ; 897,50 + 215,40 = \$1112,90. \text{ A.}$$

( 10 )

$$982,35 \times .0675 \times 4 = \$265,2345. \text{ Ans.}$$

( 11 )

$$1500 \times .0525 \times 5 = \$393,75 ; 1500 + 393,75 = \$1893,75.$$

( 12 )

$$1914,10 \times .0325 \times 6 = \$373,2495. \text{ Ans.}$$

( 13 )

$$350 \times .10 \times 21 = \$735. \text{ Ans.}$$

( 14 )

$$628,50 \times .12\frac{1}{2} \times 5 = \$387,575 ; 628,50 + 387,575 = \$1016,075.$$

( 15 )

$$75,50 \times .06 \times 10 = \$45,30 ; 75,50 + 45,30 = \$120,80. \text{ Ans.}$$

( 16 )

$$5040 \times .075 \times 2 = \$756 ; 5040 + 756 = \$5796. \text{ Ans.}$$

( 1 )

$$119,48 \times .07 \times 2\frac{1}{2} = \$20,909. \text{ Ans.}$$

( 2 )

$$250,60 \times .06 \times 1\frac{3}{4} = \$26,313. \text{ Ans.}$$

( 3 )

$$956 \times .09 \times 5\frac{1}{3} = \$458,88. \text{ Ans.}$$

( 4 )

$$1575,20 \times .07 \times 3\frac{2}{3} = \$404,3013 ; 1575 + 404,3013 \\ = \$1979,5013. \text{ Ans.}$$

( 5 )

$$5000 \times .055 \times 2\frac{1}{4} = \$618,75 ; 5000 + 618,75 = \$5618,75. \text{ Ans.}$$

( 6 )

$$1508,20 \times .10 \times 4\frac{1}{8} = \$628,416\frac{2}{3}. \text{ Ans.}$$

( 7 )

$$75 \times .125 \times 6\frac{1}{2} = \$64,0625. \text{ Ans.}$$

( 8 )

$$125 \times .0475 \times 5\frac{1}{2} = \$32,65625 ; 125 + 32,65625 = \$157,65625.$$

( 2 )

$$\$358,50 \times .07 \div 12 = 2.09125 ; 2.09125 \times 20.2 = \$42,243. \text{ A.}$$

( 3 )

$$\$1461,75 \times .06 \div 12 = 7.30875 ; 7.30875 \times 57.5 = \$420,253. \text{ A.}$$

( 4 )

$$\$1200 \times .075 \div 12 = 7.5 ; 7.5 + 28.4 = \$213. \text{ Ans.}$$

( 5 )

$$\$4500 \times .05 \div 12 = \$18,75 ; 18,75 \times 9.6\frac{2}{3} = \$181,25. \text{ Ans.}$$

( 6 )

$$\$156,25 \times .08 \div 12 = \$1,04166+ ; 1,04166 \times 10.6 = \$11,041. \text{ A.}$$

( 7 )

$$\$640 \times .065 \div 12 = 3.4666+ ; 3.4666 \times 38.3 = \$132,7707. \text{ A.}$$

( 8 )

$$\$276,5 \times .10 \div 12 = 2.30416+ ; 2.30416 \times 11.7 = \$26,958. \text{ A.}$$

( 9 )

$$\begin{aligned} \$378,42 \times .07 \div 12 &= 2.20745 ; 2.20745 \times 17.1 + 378,42 \\ &= \$416,167. \quad \text{Ans.} \end{aligned}$$

( 10 )

$$\begin{aligned} \$1250 \times .105 \div 12 &= 10.9375 ; 10.9375 \times 7.7 + 1250 \\ &= \$1334,218. \quad \text{Ans.} \end{aligned}$$

( 11 )

$$\$6500 \times .095 \div 12 = 51,4583 ; 51,4583 \times 2.3\frac{1}{3} = \$120,069. \quad A.$$

( 12 )

$$\$70,50 \times .0525 \div 12 = .3084375 ; .3084375 \times 130 = \$40,096.$$

( 13 )

$$\$45 \times .0675 \div 12 = .253125 ; .253125 \times 144.9 + 45 = \$81,677.$$

( 14 )

$$\$100 \times .04 \div 12 = .33\frac{1}{3} + ; 33\frac{1}{3} \times 186 + 100 = \$162. \quad A.$$

( 15 )

$$\$475,50 \times .08 \div 12 = 3,17 ; 3,17 \times 69.8 = \$221,266. \quad \text{Ans.}$$

( 16 )

$$\$4560 \times .07 \div 12 = 26.60 ; 26,60 \times 14.6\frac{1}{3} = \$389,246. \quad \text{Ans.}$$

( 17 )

$$\begin{aligned} \$128,375 \times .06 \div 12 &= .641875 ; .641875 \times 10.9 + 128,375 \\ &= 135,371. \quad \text{Ans.} \end{aligned}$$

( 18 )

$$\$264,52 \times .06 \div 12 = 1.3226 ; 1.3226 \times 32.4\frac{2}{3} = \$42,940. \quad \text{Ans.}$$

( 19 ) •

$$\$76,50 \times .06 \div 12 = .3825 ; .3825 \times 21.4 + 76,50 = 84,685. \quad A.$$

( 20 )

$$\$241,60 \times .07 \div 12 = 1.40933 + ; 1.40933 \times 39.5 = \$55,668. \text{ A.}$$

( 21 )

$$\$5600 \times .07 \div 12 = \$32,666 +. \text{ Ans.}$$

( 22 )

$$\$8450 \times .10 \div 12 = 70,416 + ; 70,416 \times 2 + 8450 = \$8590.832.$$

( 23 )

$$\$4000 \times .09 \div 12 = 30 ; 30 \times 1.2 = \$36. \text{ Ans.}$$

( 24 )

1853	10	10
1852	9	9

Time 1yr. 1mo. 1da.

$$\$87,60 \times .065 \div 12 = .4745 ; .4745 \times 13.0\frac{1}{3} + 87,60 = \$93,784.$$

( 25 )

1858	4	25
1854	7	8

3yr. 9mo. 17da.

$$\$126,75 \times .07 \div 12 = .739375 ; .739375 \times 45.5\frac{2}{3} + 126,75 = 160,44. \text{ Ans.}$$

( 26 )

1856	9	15
1856	1	1

8mo. 14da.

$$\$350 \times .0525 \div 12 = 1.53125 ; 1.53125 \times 8.4\frac{2}{3} = \$12.964. \text{ Ans.}$$

( 27 )

1856	12	1
1855 .	3	14

1yr. 8mo. 17da.

$$\$560,40 \times .10 \div 12 = 4,67 ; 4,67 \times 17.5\frac{2}{3} = \$82,036. \text{ Ans}$$



( 28 )

$$\$1256 \times .06 \div 12 = 6.28; 6.28 \times 11.3 = \$70.964. \text{ Ans.}$$

( 29 )

1854	5	10
1850	10	5
<hr/>		
3yr.	7mo.	5da.

$$\$745,40 \times .05 \div 12 = 3,1058; 3,1058 \times 43.1\frac{2}{3} + 745,40 \\ = \$879,467. \text{ Ans.}$$

( 30 )

1st. Time 1yr. 3mo. 21da. 2d. 9mo. 27da.

$$\$250 \times .07 \div 12 = 1,458; 1,458 \times 15.7 + 250 = \$272,8906;$$

$$\$500 \times .07 \div 12 = 2,916; 2,916 \times 9.9 + 500 = \$528,8684;$$

$$\$272,8906 + \$528,8684 = \$801,759.$$

( 31 )

From January 1st to September 1st = 8mo.

" March 15th " = 5mo. 16da.

" April 20th " = 4mo. 11da.

" June 3d " = 1mo. 28da.

Amount of \$254 for 8mo. = \$264.16

" \$154,60 " 5mo. 16da. = \$158.8772 +

" \$424,25 " 4mo. 11da. = \$433.5127 +

" \$ 75,50 " 2mo. 28da. = \$ 76.6073 +

$$\underline{\$933.1573. \text{ Ans.}}$$

( 32 )

$$\$475,75 \times .07 \div 12 = 2,7752; 2,7752 \times 8.5 = \$499,339. \text{ Ans.}$$

( 33 )

$$\$127,28 \times .06 \div 12 = .6364; .6364 \times 21 + 127.68 = 140.644. \text{ A}$$

( 34 )

At the end of the first year \$1500 must be paid, and the interest on \$4500, equal to - - - - \$1792,50

At the end of the second year \$1500, and interest on \$3000 - - - - = \$1695,00

At the end of the third year \$1500, and interest on \$1500 - - - - = \$1597,50

Amount, \$5085,00. *A.*

( 35 )

Interest on \$40 for 8 months,	-	-	-	\$1,86 $\frac{2}{3}$
" " \$40 " 7 "	-	-	-	1,63 $\frac{1}{3}$
" " \$40 " 6 "	-	-	-	1,40
" " \$40 " 5 "	-	-	-	1,16 $\frac{2}{3}$
" " \$40 " 4 "	-	-	-	,93 $\frac{1}{3}$
" " \$40 " 3 "	-	-	-	,70
" " \$40 " 2 "	-	-	-	,46 $\frac{2}{3}$
" " \$40 " 1 "	-	-	-	23 $\frac{1}{3}$

Interest due at end of time, \$8,40

Add principal due, 360,00

Amount due, \$368,40

Interest on \$368,40 for 1yr. 4mo. 15da. = \$35,458 ;

\$368,40 + 35,458 = \$403,858. *Ans.*

( 36 )

\$9000 ÷ 3 = \$3000 ;

Amount of \$3000 for 6mo. at 7 $\frac{1}{2}$  per cent, = \$3112,50

" " \$3000 for 12mo. at 7 $\frac{1}{2}$  " = \$3225

\$3000 + \$3112,50 + \$3225 = \$9337,50. *Ans.*

( 1 )

1856	6	10
------	---	----

1856	1	1
------	---	---

Time, 5mo. 9da.

\$382,50 × .07 ÷ 12 = 2.23125 ; 2.23125 × 5.3 = \$394.325. *Ans.*

( 2 )

1858	7	4
1856	3	1

Time, 2yr. 4mo. 3da.

$$\$612 \times .06 \div 12 = 3.06; 3.06 \times 28.1 + 612 = \$697.986. \text{ Ans.}$$

( 3 )

Six months added to the date of the note would make it due January 3d, 1856. On interest, 1 year and 2 days.

$$\$3120 \times .07 \div 12 = 18.20; 18.20 \times 12.0\frac{2}{3} = \$219.613;$$

$$\$3120 + \$219.613 = \$3339.613. \text{ Ans.}$$

( 4 )

1852	7	7
1851	12	3

Time, 7mo. 4da.

$$\$786.50 \times .08 \div 12 = 5.2433; 5.2433 \times 7.1\frac{1}{3} + 786.50 \\ = \$823.902. \text{ Ans.}$$

( 5 )

This note was on interest 3 months.

$$\$4560.72 \times .07 \div 12 = 26.6042; 26.6042 \times 3 + 4560.72 \\ = \$4640.532. \text{ Ans.}$$

( 6 )

This note is payable June 17th, 1857, and bears interest 1yr. 1mo. 4da.

$$\$1854.83 \times .06 \div 12 = 9.27415; 9.27415 \times 13.1\frac{1}{3} + 1854.83 \\ = 1976.630. \text{ Ans.}$$

( 2 )

$$£203.925 \times .06 \div 12 = 1.019625; 1.019625 \times 44.5\frac{1}{3} = £45.4073 \\ = £45 \text{ 8s. } 1\frac{3}{4}\text{d.}$$

( 3 )

$$£215.6833 \times .06 \div 12 = 1.078416; 1.078416 \times 42.3 \\ = £45.6169968 = £45 \text{ 12s. 4d. 2far. Ans.}$$

(4)

$$\begin{aligned} £1543.525 \times .04 \div 12 &= 5.14508; 5.14508 \times 30 = £154.3524 \\ &= £154 \text{ 7s. 0d. 2fur.} \end{aligned}$$

(5)

$$\begin{aligned} £1047.15 \times .06 \div 12 &= 5.2357; 5.2357 \times 16.5 = £86.38905; \\ £86.38905 + £1047.15 &= £1133.53905 = £1133 \text{ 10s. 9}\frac{1}{4}\text{d. + A.} \end{aligned}$$

(6)

$$\begin{aligned} £511. \text{ 1s. 4d.} &= £511.0666 +; £511.0666 \times .06 \div 12 \\ \times 78 &= £199.3159 = £199 \text{ 6s. 3d. 3fur.} \end{aligned}$$

(7)

$$\begin{aligned} £161.7625 \times .06 \div 12 &= .8088125; .8088125 \times 8.4\frac{1}{2} \\ &= £6.82098541 = £6 \text{ 16s. 5d.} \end{aligned}$$

(1)

$$\begin{array}{r|l} x & \\ \hline .06 & 12 \\ 9 & 178.9552 \\ \hline x & = \$3976.782+. \text{ Ans.} \end{array}$$

(2)

$$\begin{array}{r|l} x & \\ \hline .07 & 12^2 \quad 15,393 \\ \$0 & 76.965 \\ \hline .07 & 30.786 \\ \hline x & = \$439.80. \text{ Ans.} \end{array}$$

(3)

$$\begin{array}{r|l} x & \\ \hline .06 & 12 \\ 21 & 2 \\ & 327.3249 \\ \hline 1.26 & 7855.7976 \\ \hline x & = \$6234.76. \text{ Ans.} \end{array}$$

(4)

$$\begin{array}{r|l} x & \\ \hline .05 & 12^2 \\ 12 & 1500 \\ \hline .05 & 1500.00 \\ \hline x & = \$30000. \text{ Ans.} \end{array}$$

(5)

$$\begin{array}{r|l} x & \\ \hline .07 & 12^4 \\ 17 \$1 & 283.3914 \\ \hline 1.19 & 1133.5656 \\ \hline x & = \$952.5761+. \text{ Ans.} \end{array}$$

(6)

$$\begin{array}{r|l} 35 & 2100 \\ x & 12^2 \\ 9.4 & \$7.6 \quad 23.03 \\ & 460.60 \\ \hline 329 & 23.03 \\ \hline x & = .07. \text{ Ans.} \end{array}$$

(7)

$$\begin{array}{r|l}
 2713 & \\
 \hline
 2713 & 244.17 \\
 x & 12 \\
 \hline
 2713 & 244.17 \\
 \hline
 \end{array}$$

$x = .09.$  Ans.

(8)

$$\begin{array}{r|l}
 205.90 & \\
 \hline
 2264.490 & 2264.900 \\
 11 & x \\
 22 & 12 \\
 \hline
 \end{array}$$

$x = .10.$  Ans.

(9)

$$\begin{array}{r|l}
 36 & \\
 \hline
 1144.8 & 62.964 \\
 x & 12 \\
 \hline
 31.8 & 62.964 \\
 \hline
 \end{array}$$

$x = .055.$  Ans.

(10)

$$\begin{array}{r|l}
 8 & \\
 \hline
 8 & 1. \\
 x & 12 \\
 \hline
 12 & 1. \\
 \hline
 \end{array}$$

$x = .12\frac{1}{2}.$  Ans.

(11)

$$\begin{array}{r|l}
 93.29 & \\
 \hline
 93.29 & 2798.7 \\
 x & 12 \\
 \hline
 .07 & 12 \\
 \hline
 \end{array}$$

$x = 30\text{mo.} = 2\text{yr. } 6\text{mo. } A.$

(12)

$$\begin{array}{r|l}
 5 & \\
 \hline
 5 & 18 \\
 x & 12 \\
 \hline
 .06 & 12 \\
 \hline
 \end{array}$$

$x = 3.6\text{mo.} = 3\text{mo. } 18\text{da. } A.$

(13)

$$7850 - 7500 = \$350, \text{ interest.}$$

(14)

$$\begin{array}{r|l}
 7850 & 4 \\
 \hline
 7850 & 4 \\
 x & 12 \\
 \hline
 \end{array}$$

$x = 16\text{mo.} = 1\text{yr. } 4\text{mo. } A.$

$$\begin{array}{r|l}
 5000 & 12 \\
 \hline
 5000 & 12 \\
 x & 12 \\
 \hline
 \end{array}$$

$x = 200\text{mo.} = 16\text{yr. } 8\text{mo. } A.$

(15)

$$\$5009.60 - \$3720 = \$1289.60$$

Interest on \$700 for 1yr. 8mo  
at 6 per cent, is \$70; then how  
long will it take \$750 to gain \$70?

$$\begin{array}{r|l}
 3720 & 4.16 \\
 \hline
 .065 & 12 \\
 x & 12 \\
 \hline
 .065 & 4.16 \\
 \hline
 \end{array}$$

$x = 64\text{mo.} = 5\text{yr. } 4\text{mo.}$

(16)

$$\begin{array}{r|l}
 25 & 4 \\
 \hline
 1.50 & 28.00 \\
 x & 12 \\
 \hline
 .06 & 12 \\
 \hline
 \end{array}$$

$x = 18\frac{2}{3}\text{mo.} = 1\text{yr. } 6\text{mo. } 20\text{da.}$

( 2 )

Principal on interest from Feb. 6th, 1850,	\$6478.84	
Interest to Feb. 1st, 1856, (time 5yr. 11mo. 25da.) - - - - -	2326.9833	
Amount,	\$8805.8233	
Payment May 16, 1853, - \$ 545.76		
"    May 16, 1855, - \$1276.		
"    Feb. 1st, 1856, - \$2074.72		
Their sum exceeds the interest then due,	\$3896.48	
Remainder for a new principal, Feb. 1st, 1856, - - - - -	\$4909.3433	
Interest on \$4909.3433 from Feb. 1st, 1856, to Aug. 11, 1857, (1yr. 6mo. 10da.)	450.0231	
Amount due Aug. 11th, 1857, - - -	\$5359.3665.	Ans.

( 3 )

Principal on interest from Sept. 5, 1851,	\$7851.04	
Interest to March 1, 1855, (3yr. 5mo. 26da.)	1643.4843	
Amount,	\$9494.5243	
Payment Nov. 13th, 1853, \$416.98		
"    May 10th, 1854, \$152.		
Their sum, - - - - -	\$568.98	
Amount due March 1st, 1855, - - -	\$8925.5443.	Ans.

( 4 )

Principal on interest from Jan. 3d, 1854,	\$8974.56	
Interest to Feb. 16th, 1855, (1yr. 1mo. 13da.)	703.256	
Amount,	\$9677.816	
Payment Feb. 16th, 1855, - - - -	1875.40	
Remainder for new principal, Feb. 16, 1855,	\$7802.416	
Interest to Sept. 15, 1856, (1yr. 6mo. 29da.)	863.249	
Amount,	\$8665.665	

	8665,665	
Payment Sept. 15th, 1856, - - -	3841,26	
Remainder for new principal Sept. 15, 1856,	<u>\$4824,405</u>	
Interest to Nov. 11th, 1857, (1yr. 1mo. 26da.)	390,240	
Amount,	<u>\$5214,646</u>	
Payment Nov. 11th, 1857, - - -	1809,10	
Remainder for new principal, Nov. 11, 1857,	<u>\$3405,546</u>	
Interest to June 9th, 1858, (6mo. 28da.) -	137,735	
Amount,	<u>\$3543,281</u>	
Payment June 9th, 1858, - - -	2421,04	
Remainder for new principal, June 9, 1858,	<u>\$1122,241</u>	
Interest to July 1st, 1858, (22da.) - -	4,800	
Amount due July 1st, 1855,	<u>\$1127,041.</u>	<i>Ans.</i>

## ( 5 )

Principal on interest, from Nov. 1st, 1852, -	\$345,50	
Interest to June 20th, 1853, (7mo. 19da.) -	15,384	
Amount, - -	<u>\$360,884</u>	
Payment June 20th, 1853, - - -	75	
Remainder for new principal, June 20th, 1853,	<u>\$285,884</u>	
Interest to Dec. 13th, 1856, (3yr. 5mo. 23da.,)	69,652	
Amount. - -	<u>\$355,536</u>	
Payment Jan. 12th, 1854, - \$10,		
Payment March 3d, 1855, - \$15,50		
Payment Dec. 13th, 1856, - \$52,75		
Their sum, - - -	<u>\$78,25</u>	
Remainder for a new principal, Dec. 13th, 1856,	<u>\$277,286</u>	
Interest to October 14th, 1857, (10mo. 1da.,)	16,228	
Amount, - - -	<u>\$293,514</u>	
Payment Oct. 14th, 1857, - - -	106,75	
Remainder for new principal, Oct. 14th, 1857, -	<u>\$186,764</u>	
Interest to Feb. 4th, 1858, (3mo. 20da.) -	3,994	
Amount due Feb. 4th, 1858, - -	<u>\$190,758</u>	

( 6 )

Principal on interest, from Oct. 19th, 1850,	-	\$450
Interest to Sept. 25th, 1851, (11mo. 6da.,)	-	33,60
Amount,	-	<u>\$483,60</u>
Payment September 25th, 1851,	-	85,60
Remainder for new principal Sept. 25th, 1851,	-	<u>\$398,00</u>
Interest to June 6th, 1853, (1yr. 8mo. 11da.,)	-	54,039
Amount,	-	<u>\$452,039</u>
Payment July 10th, 1852,	-	\$20
Payment June 6th, 1853,	-	<u>150,45</u>
Their sum,	-	<u>\$170,45</u>
Remainder for new principal June 6th, 1853,	-	<u>\$281,589</u>
Interest to May 5th, 1855, (1yr. 10mo. 2da.)	-	43,114
Amount,	-	<u>\$324,703</u>
Payment Dec. 28th, 1854,	-	\$25,125
Payment May 5th, 1855,	-	<u>\$169</u>
Their sum,	-	<u>\$194,125</u>
Remainder for new principal May 5th, 1855,	-	<u>\$180,578</u>
Interest to October 18th, 1857, (2yr. 5mo. 13da.)	-	25,622
Amount due October 18th, 1857,	-	<u>\$156,200</u>

## COMPOUND INTEREST.

( 2 )

$$175 \times .07 + 175 = \$187,25; 187,25 \times .07 + 187,25 = \$200,3575;$$

$$\$200,3575 - \$175 = \$25,3575. \text{ Ans.}$$

( 3 )

$$240 \times .05 + 240 = \$252; 252 \times .05 + 252 = \$264,60; 264,60$$

$$\times .05 + 264,60 = \$277,83; 277,83 \times .05 + 277,83 = \$291,7215.$$

( 4 )

$$300 \times .06 + 300 = \$318; 318 \times .06 + 318 = \$337,08;$$

$$337,08 \times .06 + 337,08 = \$357,3048; 357,3048 - 300 = \$57,3048$$

Ans.

( 5 )

$$590,74 \times .06 + 590,74 = \$626,1844; 626,1844 \times .06 + 626,1844$$

$$= 663,7554; 663,7554 - 590,74 = \$73,015. \text{ Ans.}$$



(6)

$$500 \times .08 + 500 = \$540; 540 \times .06 + 540 = \$583.20;$$

$$583.20 - 500 = \$83.20. \text{ Ans.}$$

(7.)

$$3758.56 \times .07 + 3758.56 = \$4021.659; 4021.659 \times .07$$

$$+ 4021.659 = \$4303.175; 4303.175 \times .07 + 4303.175$$

$$= \$4604.397; 4604.397 - 3758.56 = \$845.837. \text{ Ans.}$$

(8)

$$95637.50 \times .06 + 95637.50 = \$101375.75; 101375.75 \times .06$$

$$+ 101375.75 = \$107458.295; 107458.295 \times .06 + 107458.295$$

$$= \$113905.792; 113905.729 \times .06 + 113905.729 = \$120740.139;$$

$$120740.139 \times .06 + 120740.139 = \$127984.547; 127984.547$$

$$\times .06 + 127984.547 = \$135663.619; 135663.619 \times .06$$

$$+ 135663.619 = \$143803.436; 143803.436 - 95637.50$$

$$= 48165.936. \text{ Ans.}$$

(9)

75439,75	principal for 1st year.
3394,7887	interest for 1st year.
<u>78834,5387</u>	principal for 2d year.
3547,5542	interest for 2d year.
<u>82382,0929</u>	principal for 3d year.
3707,1941	interest for 3d year.
<u>86089,2871</u>	principal for 4th year.
3874,0179	interest for 4th year.
<u>89963,3050</u>	amount at 4 years.
75439,75	principal for 1st year.
<u>314523,555</u>	compound interest for 4 years.

(10)

$$1.42576 \times 650 = \$926,744. \text{ Ans.}$$

(11)

$$2.65329 \times 3204318 = 8501984.90622+. \text{ Ans.}$$

( 12 )

\$643,7409 amount for 3 years.

20,9215 interest for 6mo. 15da.

\$664,6624 amount for 3yr. 6mo. 15da.

540,50

\$124,1624 compound interest for 3yr. 6mo. 15da.

( 13 )

\$147,5362 amount of \$75 for 10 years.

4,0449 interest on \$147,5362 for 4mo. 21da.

\$151,5811 amount for 10yr. 4mo. 21da.

( 14 )

\$210 amount of \$200 for 1 year.

6,3875 interest on \$210 for 7mo. 9da.

\$216,3875

200

\$ 16,3875 compound interest.

( 15 )

Time is 2 years and 6 months, or 5 times 6 months.

\$375,40 principal for first 6 months.

13,139 interest for first 6 months.

\$388,539 principal for second 6 months.

13,598 interest for second 6 months.

\$402,137 principal for third 6 months.

14,074 interest for third 6 months.

\$416,212 principal for fourth 6 months.

14,567 interest for fourth 6 months.

\$430,780 principal for fifth 6 months.

15,077 interest for fifth 6 months.

\$445,857 amount for 2 years 6 months.

## DISCOUNT.

( 1 )

$$\$615 \div 1.09\frac{1}{3} = \$562,50 \text{ present value.}$$

( 2 )

$$\$202,58 \div 1.098 = \$184,499 + \text{present value.}$$

( 3 )

$$\$721 \div 1.03 = \$700 \text{ present value; } 721 - 700 = \$21 \text{ discount.}$$

( 4 )

$$\$5160 \div 1.032 = \$5000 \text{ present value.}$$

( 5 )

$$\$2500 \div 1.314 = \$1902,587 + \text{present value.}$$

( 6 )

$$\$3000 \div 1.085\frac{5}{9} = \frac{2700}{9} \div \frac{9779}{9} = \$2763,562 \text{ present value;}$$

$$\$3000 - \$2763,562 = \$236,438 \text{ discount.}$$

( 7 )

$$\$1250 \div 1.015 = \$1231,527 + \text{present value for 3mo. at 6 per ct.}$$

$$1250 \div 1.03 = \$1213,592 + \quad \quad \quad \text{"} \quad \quad \quad \text{"} \quad \quad \quad \text{6} \quad \quad \quad \text{"} \quad \quad \quad \text{"}$$

$$1250 \div 1.045 = \$1196,172 + \quad \quad \quad \text{"} \quad \quad \quad \text{"} \quad \quad \quad \text{9} \quad \quad \quad \text{"} \quad \quad \quad \text{"}$$

$$1250 \div 1.06 = \$1179,245 + \quad \quad \quad \text{"} \quad \quad \quad \text{"} \quad \quad \quad \text{12} \quad \quad \quad \text{"} \quad \quad \quad \text{"}$$

$$\underline{\$4820,537} \quad \text{present value of \$5000.}$$

( 8 )

$$\$4987,50 \div 1.03906\frac{1}{4} = \$4800 + \text{present value.}$$

( 9 )

Time is 2 months 16 days.

$$\$1400 \div 1.014\frac{7}{9} = \$1379,6123 + \text{present value.}$$

( 10 )

$$10,50 \times 300 = \$3150 \text{ cost.}$$

$$\$12 \times 300 = \$3600 \text{ sold it for on credit.}$$

$$3600 \div 1.0175 = \$3538,083 \text{ cash value.}$$

$$3538,083 - 3150 = \$ 388,083 \text{ gain.}$$

( 11 )

$$2500 \div 1.015 = \$2463,05418 + \text{ present value.}$$

$$2500 \div 1.03 = \$2427,18446 + \text{ " "}$$

$$\$5000,000 \text{ cash.}$$

$$\underline{\$9890,23864} + \text{ cash value of the property.}$$

( 12 )

$$78 \times 86 \times .25 = \$1677 \text{ cost.}$$

$$78 \times 86 \times .25\frac{1}{2} = \$1710,54 \text{ what it sold for on 4mo. credit.}$$

$$1710,54 \div 1.02\frac{2}{3} = \$1666,110 + \text{ cash value of the sale.}$$

$$1677 - 1666,110 = \$10,890 + \text{ loss.}$$

( 13 )

$$.077669 + \text{ cash value, per pound, at 8 cents for 6mo.}$$

$$.073529 + \text{ " " " at } 7\frac{1}{2} \text{ " 4 "}$$

$$.00414 \text{ most advantageous to buy at } 7\frac{1}{2} \text{ cents a pound.}$$

( 14 )

$$10 \times .20 = \$2; 10 + 2 = \$12; 12 \div .90 = \$13,33\frac{2}{3}. \text{ Ans.}$$

$$\text{PROOF. } 10 \text{ per cent. of } \$13,33\frac{2}{3} = \$1,33\frac{2}{3}; \$13,33\frac{2}{3} - 1.33\frac{2}{3} \\ = \$12, \text{ selling price.}$$

( 15 )

In the second part of the question the first note is on interest 1 month; the second 3mo. 9da.; the third 4 months.

$$\$1000 \div 1.005 = \$995,0248 + \text{ value July 1st.}$$

$$500 \div 1.0165 = \$491,8839 + \text{ " "}$$

$$900 \div 1.02 = \$882,3529 + \text{ " "}$$

$$\underline{\$2369,2617} \text{ value of the 3 notes July 1st.}$$

The amount of \$1000 for 1 month at 6 per cent. is	\$1005
" " \$ 500 for 3mo. 9da.	508,25
" " \$ 900 for 4 months	918,00
Value of the 3 notes when due,	\$2431,25
	2369,2617
Difference in value July 1st and when due,	\$ 61,9883

## BANK DISCOUNT.

( 1 )

$$(300 \times .06) \div 12 = \$1,50 ; 1,50 \times 4.1 = \$6,15. \text{ Ans.}$$

( 2 )

$$(200 \times .09) \div 12 = \$1,50 ; 1,50 \times 5.1 = \$7,65. \text{ Ans.}$$

( 3 )

$$500 \times .065 \div 12 = \$2,7083 ; 2,7083 \times 8.6 = \$23,2913 \text{ discount.}$$

$$500 - \$23,2913 = \$476,708 \text{ proceeds}$$

( 4 )

$$(1255,38 \times .07) \div 12 = \$7,323 ; 7,323 \times 4.1 = \$30,0243 ;$$

$$1255,38 - 30,0243 = \$1225,3557 \text{ proceeds.}$$

( 5 )

Time is 1 month 15 days.

$$(500 \times .07) \div 12 = \$2,916 ; 2,916 \times 1.5 = \$4,374. \text{ Ans.}$$

( 6 )

$$4368 \times 1.25 = \$5460 \text{ cost of the wheat.}$$

$$4368 \times 1.30 = \$5678,40 \text{ sold it for.}$$

$$5678,40 \times 0.7 \div 12 = \$33,124 ; 33,124 \times 4.1 = \$135,8084 + \text{dis.}$$

$$5678,40 - 135,8084 = \$5542,5916 ; 5542,5916 - 5460$$

$$= \$82,5916, \text{ gain.}$$

( 7 )

 $(7000 \times .06) \div 12 = \$35$ ;  $35 \times 7.1 = \$248.50$  bank discount.

 $7000 \div 1.035 = \$6763.285$ ;  $7000 - 6763.285$ 
 $= 236.715$  true discount.

 $248.50 - 236.715 = \$11.785$  difference.

( 8 )

 $10000 \times .08 \div 12 = \$66.66\frac{2}{3}$ ;  $66.66\frac{2}{3} \times 4.6$ 
 $= \$306.66\frac{2}{3}$  bank discount.

 $10000 \div 1.03 = \$9708.7378$ ;  $10000 - 9708.7378$ 
 $= 291.2622$  true discount.

 $306.6666 - 291.2622 = \$15.4044$  difference.

( 9 )

Time 4 months 3 days.

 $(1000 \times .055) \div 12 = \$4.583$ ;  $\$4.583 \times 4.1 = \$18.79 +$  discount.

 $1000 - 18.79 = \$981.21$  cash value.

( 10 )

When A turns in the note at the bank, it will have 4 months and 3 days to run; therefore, they will take discount on \$1500 for 4 months and 3 days, which will be \$25.625;  $\$1000 + \$25.625 = \$1025.625$  taken from \$1500 leaves \$474.375 what A received back.

## BANKING.

( 2 )

 $.9644\frac{1}{8}$  present value of \$1 for 6 months 3 days.

 $285.95 \div .9644\frac{1}{8} = \$296.50.$  Ans.

( 3 )

 $.968$  present value of \$1 for 6 months 12 days.

 $674.89 \div .968 = \$697.20.$  Ans.

( 4 )

$$9.125 \times 380 = \$3467,50 \text{ cost of the flour.}$$

$$.9845 \text{ present value of \$1 for 3mo. 3da., at 6 per cent.}$$

$$3467,50 \div .9845 = \$3522,092 \text{ face of the note.}$$

## COMMISSION.

( 3 )

$$3125 + 1520 = \$4645; 4645 \times .0075 = \$34.8375. \text{ Ans.}$$

( 4 )

$$750 \times 9,75 = \$7312,50; 7312,50 \times .02\frac{1}{4} = \$164,53125. \text{ Ans.}$$

( 5 )

$$96 \times 9\frac{1}{2} \text{ cwt.} = 912 \text{ cwt.}; 912 \times 6,50 = \$5928;$$

$$5928 \times 1.01\frac{1}{4} = \$96,33;$$

$$5928,00 - 96,33 = \$5831,67. \text{ Ans.}$$

( 6 )

$$2\frac{3}{4} + 1\frac{1}{4} = 4 \text{ per cent. commission.}$$

$$2340 \times 1,75 = \$4095 \text{ first cost of the wheat.}$$

$$4095 \times .04 = \$163,80 \text{ his commission.}$$

$$4095 \times .06 = \$245,70 \text{ commission and freight.}$$

$$\$4095 + \$245,70 = \$1340,70 \text{ entire cost of the wheat.}$$

( 7 )

$$2564,25 \times .045 = \$115,39+. \text{ Ans.}$$

( 8 )

$$267581 \times .09\frac{1}{2} = \$25420,195. \text{ Ans.}$$

( 9 )

$$7320,25 \times .06625 = \$484,9665; 7320,25 - 484,9665$$

$$= \$6835,283. \text{ Ans.}$$

( 10 )

$$1000 \times .065 = \$65; 1000 - 65 = \$935. \text{ Ans.}$$

( 11 )

$$2608,625 \div 1.025 = \$2545 \text{ purchase money.}$$

$$2608,625 - 2545 = \$63,625 \text{ commission.}$$

$$2545 \div .56 = 4544,642 + \text{ bushels. } \textit{Ans.}$$

( 12 )

$$2\frac{3}{4} + \frac{1}{2} = 3\frac{1}{2} = .031 \text{ per cent.}$$

$$2640 \times .031 = 81,84 ; 2640 - 81,84 = 2558,16. \textit{Ans.}$$

( 13 )

$$42,66 \div .018 = \$2370 \text{ purchase money.}$$

$$240 \times .06\frac{1}{4} = \$15 \text{ cost of one barrel.}$$

$$2370 \div 15 = 158 \text{ barrels.}$$

$$2370 + 42,66 = \$2412,66 \text{ whole amount.}$$

( 14 )

$$3476 \times .12\frac{1}{2} = \$434,50 \text{ the whole amount.}$$

$$434,50 \times .03\frac{1}{4} = 13,578 ; 434,50 - 13,578 = \$420,922. \textit{Ans.}$$

( 15 )

$$708,75 \div 1.05 = \$675 \text{ purchase money.}$$

$$675 \div 45 = 15 \text{ tons. } \textit{Ans.}$$

( 16 )

$$1500 \times .025 = 37,50$$

$$1000 \times .0325 = 32,50$$

$$\underline{\$70} \text{ amount of loss.}$$

( 17 )

$$2204 \times .0075 = 16,53 ; 2204 - 16,53 = \$2187,47 ;$$

$$2187,47 \div 109,3735 = 20 \text{ shares.}$$

( 18 )

$$\frac{5}{8} \text{ of } 2 = 1\frac{1}{4} \text{ per cent.}$$

$$56448,90 \times .0125 = 705,61025 ; 56448,90 - 705,61025$$

$$= \$55743,289. \textit{Ans.}$$



## STOCKS AND BROKERAGE.

( 1 )

 $\$1 - .05\frac{1}{2} = .94\frac{1}{2}$ ;  $.94\frac{1}{2} + \frac{1}{2} = .95$  cost of \$1 of stock. $56 \times 100 = \$5600$ ;  $5600 \times .95 = \$5320$ . *Ans.*

( 2 )

.88 what he paid for \$1 of stock.

1.06 $\frac{1}{2}$  what he received for \$1 of stock. $36 \times 100 = 3600$  par value;  $3600 \times .88 = \$3168$ ;  $3600 \times 1.06\frac{1}{2}$  $= \$3834$ ;  $3834 - 3168 = \$666$  profit.

( 3 )

 $257 \times 200 = \$51400$  par value;  $51400 \times 1.15 = \$59110$ . *Ans.*

( 4 )

 $150 \times 120 = \$18000$  par value;  $18000 \times 1.18\frac{3}{4} = \$21375$ . *A.*

( 5 )

 $\$0.92\frac{3}{4}$  what \$1 of stock cost;  $125 \times 69 = \$8625$  par value. $8625 \times .92\frac{3}{4} = \$7999,6875$ . *Ans.*

( 6 )

 $\$1 + .06\frac{1}{2} + \frac{1}{4} = \$1,06\frac{3}{4}$  cost of \$1 of stock. $200 \times 1000 = 200000$  par value. $200000 \times 1.06\frac{3}{4} = 213500$ . *Ans.*

( 7 )

 $125 \times 20 = \$2500$  par value. $2500 \times .05 = \$125$   $2500 \times .07 = \$175$  1 year's interest. $2500 \times .04 = \$100$   $2500 + 175 = \$2675$  amount. $\$225$  dividend. $2500 \times 1.10 = \$2750$  what he sold the stock for;  $2750 + 225$  $= \$2975$  amount including premium and dividends. $2975 - 2675 = \$300$  profit.

( 1 )

$$3000 \div .85 = \$3529,41 +. \text{ Ans.}$$

( 2 )

Each share will cost \$114; hence,  
 $\$6384 \div \$114 = 56$ , number of shares. *Ans.*

( 3 )

\$0.92 $\frac{1}{4}$  will buy 1 dollar at par value; hence,  
 $\$3700 \div .925 = \$4000$ , the par value of what \$3700 will buy.

( 4 )

.96 $\frac{3}{4}$  market value of \$1 of stock;  $7000 \div .96\frac{3}{4} = \$7235,142 +.$

( 5 )

\$1,08 $\frac{3}{4}$  market value of \$1 of stock;  $8700 \div 1,0875 = \$8000$ .

( 6 )

$12000 \times .96\frac{1}{2} = \$11580$  market value of the funds.  
 $1 + .10\frac{1}{4} + \frac{3}{4} = \$1,11$  market value of \$1 of bank stock.  
 $11580 \div 1,11 = \$10432,432 +. \text{ Ans.}$

( 1 )

\$1 - 12 $\frac{1}{4}$  cents = \$0.87 $\frac{1}{2}$ , price of \$1 of stock.  $\begin{array}{r|l} .875 & \$1 \\ x & .07 \\ \hline & x = .08 \end{array}$   
 $\$1 \times .07 \div .875 = .08$ , or 8 per cent.

( 2 )

$\$1 \times .08 \div .10 = .80$  value of \$1 of stock bought.  
 $\$1 - .80 = .20$ ; or rate 20 per ct. discount.  $\begin{array}{r|l} x & \$1 \\ .10 & .08 \\ \hline & x = .80 \end{array}$

( 3 )

5 per cent. would be the annual dividend:  
 $\$1 \times .05 \div .62\frac{1}{2} = .08$ , or 8 per cent.  $\begin{array}{r|l} .625 & \$1 \\ x & .05 \\ \hline & x = .08 \end{array}$

(4)

.875 cost of \$1 of stock :

 $\$1 \times .07 \div .875 = .08$ , or 8 per cent. is the rate.

$$\begin{array}{r|l} .875 & \$1 \\ x & .07 \\ \hline x = & .08 \end{array}$$

(5)

 $\$1 \times .07$  yield of \$1 of stock : $.07 \div .12 = .5833$  ; $1 - .5833 = .4166$ , or discount  $41\frac{2}{3}$  per cent.

$$\begin{array}{r|l} x & \$1 \\ .12 & .07 \\ \hline x = & .5833 + \end{array}$$

(6)

 $\$1.20$  value of \$1 of stock ;  $\$1 \times .06 \div 1.20 = .05$  rate of int.

(2)

 $\$1 \times .06 \div 100 = .06$  ;  $\$1 \times .07 \div 1.07 = .0654$  ;

7 per cent. the best investment.

(3)

 $\$1 \times .08 \div 1.20 = .066\frac{2}{3}$  rate of profit of 8 per cent. $\$1 \times .05 \div .80 = .0625$  rate of profit of 5 per cent.

8 per cent. the best investment.

(4)

 $\$1 \times .05 \div 1.00 = .05$  rate of profit of the 5 per cent. $\$1 \times .06 \div .90 = .06\frac{2}{3}$  rate of profit of the 6 per cent. $2000 \times .05 \times 5 = \$500$  profit for 5 years of the 5 per cent. $2000 \times .06\frac{2}{3} \times 5 = \$666,66\frac{2}{3}$  for 5 years of the 6 per cent. $\$666,66\frac{2}{3} - 500 = \$166,66\frac{2}{3}$  difference of proceeds.

## PROFIT AND LOSS.

(1)

 $250 \times 9 \times .07 = \$157,50$  ;  $250 \times 9 \times .08\frac{1}{2} = \$191,25$  ; $191,25 - 157,50 = \$33,75$ . *Ans.*

( 2 )

After one-third leaked out, *2 hhd.* remained, equal to 126 *gal.*

$68,04 + 2,52 = \$70,56$  what the remainder must sell for

$70,56 \div 126 = .56$  cents per gallon.

( 3 )

$360 \times .75 = \$270$  cost of keeping.

$360 \times 1.25 = \$450$  value of wool.

$90 \times .62\frac{1}{2} = \$56,25$  value of lambs.

$(450 + 56,25) - 270 = \$236,25$  profit.

( 1 )

$195,50 \div 1.15 = \$170$  cost.

( 2 )

*78 cwt.. 3 gr. 14 lb.* = 7889 *lb.*;  $7889 \times .08 = \$631,12$ ;

$631,12 \div 1.15 = \$548,80$  cost.

( 3 )

$\$7 \div .875 = \$8$  asking price.

$\$8 \div 1,33\frac{1}{3} = \$6$  cost.

( 4 )

$472,50 \div 1.35 = \$350$  cost of the first horse.

$472,50 \div .90 = \$525$  cost of the second horse.

$\$875$  cost of both horses.

$472,50 \times 2 = \$945$  what both horses sold for ;  $945 - 875$

$= \$70$  gain.

( 1 )

$375 \times .75 = \$281,25$  ;  $281,25 \times .20 = \$56,25$  ;  $281,25 + 56,25$

$= \$337,50$  ;  $337,50 \div 375 = \$0,90$ . *Ans.*

( 2 )

1 pipe=126 gallons.

$$322,56 \times .25 = \$70,64 ; 322,56 + 70,64 = \$393,20 ;$$

$$393,20 \div 126 = \$3,20 \text{ per gallon.}$$

( 3 )

$$3493,33\frac{1}{3} \times .10 = \$349,33\frac{1}{3} ; 3493,33\frac{1}{3} - 349,33\frac{1}{3} = \$3144 ;$$

$$3144 \div 3275 = \$0,96 \text{ per bushel.}$$

( 4 )

$$4,70 \div .94 = \$5,00 \text{ cost per yard ; } 5,00 \times .14 = 70 \text{ cts. gain ;}$$

$$5,00 + .70 = \$5,70. \text{ Ans.}$$

( 5 )

$$150,25 \times .40 = \$60,10 \text{ gain ; } 150,25 \times .28 = \$42,07 \text{ loss ;}$$

$$60,10 - 42,07 = \$18,03 \text{ balance of gain.}$$

( 6 )

$$144 - 36 = 108 \text{ gallons remains.}$$

$$144 \times .45 = \$64,80 \text{ cost ; } 64,80 \times .10 = \$6,48 \text{ gain ;}$$

$$64,80 + 6,48 = \$71,28 ; 71,28 \div 108 = \$0,66 \text{ per gallon.}$$

( 7 )

$$5 + 3 + 2 + 40 = 50 \text{ per cent. to be gained.}$$

$$3500 \times 1,20 = \$4200 \text{ cost ; } 4200 \times .50 = \$2100 \text{ gain ;}$$

$$4200 + 2100 = \$6300 ; 6300 \div 3500 = \$1,80 \text{ per bushel.}$$

( 1 )

$$425 - 348,50 = \$76,50 \text{ whole gain ; } 76,50 \div 425$$

$$=.18, \text{ or } 18 \text{ per cent.}$$

( 2 )

$$.07\frac{1}{2} - .06 = .015 \text{ gain ; } .015 \div .06 = .25 \text{ gain per cent.}$$

( 3 )

$$1.20 - .90 = .30 ; .30 \div .90 = .33\frac{1}{3} \text{ per cent. on the rye.}$$

$$1.50 - 1.12\frac{1}{2} = .37\frac{1}{2} ; .375 \div 1.125 = .33\frac{1}{3} \text{ per cent. on the wheat.}$$

( 4 )

$20 \times .18 = \$3.60$  what it sold for per ream ;  
 $\$3.60 - \$2 = \$1.60$  gain per ream ;  
 $1.60 \div 2 = .80$  gain per cent.

( 5 )

$13 \text{ cwt. } 3 \text{ qr. } 14 \text{ lb.} = 13.89 \text{ cwt.}$ , or 1389 pounds.  
 $13.89 \times 8 = \$111.12$  cost ;  $1389 \times .10 = \$138.90$  what it sold for.  
 $138.90 - 111.12 = \$27.78$  whole gain.  
 $27.78 \div 111.12 = .25$  gain per cent.

( 6 )

$45 \text{ T. } 16 \text{ cwt. } 25 \text{ lb.} = 45.8125 \text{ tons}$  ;  
 $45.8125 \times 75 = \$3435.9375$  cost ;  $45.8125 \times 78.50$   
 $= \$3596.28125$  what it sold for ;  
 $3596.28125 - \$3435.9375 = \$160.34375$  whole gain ;  
 $160.34375 \div 3435.9375 = .046 +$  gain per cent.

( 7 )

$10 \div 1.25 = \$8$  cost ;  $11.60 - 8 = \$3.60$  whole gain.  
 $3.60 \div 8 = .45$  gain per cent.

( 8 )

$25650 \times 19.20 \div 1000 = \$492.48$  ;  $492.48 \div 1.20 = \$410.40$  cost.  
 $25650 \times 15 \div 1000 = \$384.75$  ;  $410.40 - 384.75 = \$25.65$  loss.

( 9 )

$3881.25 \div 1.125 = \$3450$  cost ;  $3450 - 3277.50$   
 $= \$172.50$  whole loss ;  $172.50 \div 3450 = .05$  loss per cent.

( 10 )

$.66 \div 1.20 = .55$  cost ;  $.77 - .55 = .22$  gain on 1 lb.  $.22 \div .55$   
 $= .40$  gain per cent.

( 11 )

$5520 \times .50 = \$2760$ , what the corn sold for ;  $2760 \div .92 = \$3000$ , what it cost ;  $5520 \times .60 = \$3312$  ;  $3312 - 3000 = \$312$ , whole gain ;  $312 \div 3000 = .10\frac{2}{3}$ , gain per cent.

( 12 )

$1412\frac{1}{2} \times 3 \times .11 = \$466,125$  ;  $466,125 \div 1,375 = \$339$ , cost.  
 $339 \times .50 = \$169,50$ , gain ;  $339 + 169,50 = \$508,50$ . *Ans.*

## INSURANCE.

( 1 )

$147674 \times .03\frac{1}{2} = \$5168,59$ . *Ans.*

( 2 )

$47520 \times .005 = \$237,60$ . *Ans.*     $47520 \times .00\frac{1}{2} = \$158,40$ . *Ans.*

( 3 )

$16800 \times .015 = \$252$ . *Ans.*     $16800 \times .0075 = \$126$ . *Ans.*

( 4 )

$\frac{2}{3}$  of  $\frac{3}{4} = \frac{1}{2}$  ;  $\frac{1}{2}$  of 24000 = \$12000 ;  $12000 \times .025 = \$300$ . *Ans.*

( 5 )

$5640 \times .0075 = \$42,30$  ;  $7560 \times .00625 = \$47,25$  ;  
 $42,30 + 47,25 = \$89,55$ . *Ans.*

( 6 )

$425 \times 15 \times .0075 = \$47,8125$ . *Ans.*

( 7 )

$150 \times 63 \times .35 = \$3307,50$ , first cost ;  $150 \times 63 \times .50 = \$4725$ ,  
 selling price ;  $4725 \times .035 = \$165,375$ , insurance ;  
 $3307,50 + 165,375 = \$3472,875$ , whole cost ;  $4725 - 3472,875$   
 $= \$1252,125$ , gain. *Ans.*

( 8 )

$$3640 \times .045 = \$163,80. \text{ Ans.}$$

( 9 )

$$\begin{aligned} 12000 \times .0275 &= \$330 ; 18500 \times .0325 = \$601,25 ; 330 + 601,25 \\ &= \$931,25 ; 20450 + 25600 + 931,25 = \$46981,25 ; \\ 12000 + 18500 &= \$30500 ; 46981,25 - 30500 \\ &= \$16481,25, \text{ total loss.} \end{aligned}$$

( 10 )

$$\begin{aligned} 5000 \times 10,50 &= \$52500, \text{ value of the flour ; } 2887,50 \div 52500 \\ &= .05\frac{1}{2}, \text{ per cent for insurance.} \end{aligned}$$

( 11 )

$$120 \div 7500 = .01\frac{2}{3} \text{ per cent.}$$

( 12 )

$$\begin{aligned} 225 \times 40 \times 3,50 &= \$31500, \text{ cost of cloth ; } \$1323 \div 31500 = .04\frac{1}{2} \\ &\text{per cent for insurance.} \end{aligned}$$

( 13 )

$$1320 \div .055 = \$24000. \text{ Ans.}$$

( 14 )

$$\begin{aligned} 51 \div .015 &= \$3400, \text{ value of storehouse ; } 126,45 \div .0225 \\ &= \$5620, \quad \text{ " contents.} \\ \$9020, &\text{ whole value of property insured.} \end{aligned}$$

( 15 )

$$\begin{aligned} 275 \times 15 &= \$4125, \text{ value of pianos ; } \$4125 \times .03 = \$123,75, \\ \text{premium ; } 123,75 \times .03 &= \$3,7125, \text{ insurance on premium ;} \\ 123,75 + 3,7125 &= \$127,4625, \text{ amount of insurance.} \end{aligned}$$

( 16 )

$$\begin{aligned} 16750 \times .0175 &= \$293,125, \text{ premium ;} \\ 293,125 \times .0175 &= \$5,1296, \text{ amount of premium ;} \\ 293,125 + 5,1296 &= \$298,2546, \text{ amount of insurance.} \end{aligned}$$



## LIFE INSURANCE.

( 1 )

$$8950 \times 1,36 \div 100 = \$121,72. \quad \text{Ans.}$$

( 2 )

$$12500 \times 1,86 \div 100 = \$232,50. \quad \text{Ans.}$$

( 3 )

$$\$15000 \times 1,75 \div 100 = \$262,50. \quad \text{Ans.}$$

( 4 )

$$\frac{1}{2} \text{ of } \frac{1}{2} = \frac{1}{4} \text{ per cent.} = 40 \text{ cents on } \$100.$$

$$5000 \times 40 \div 100 = \$20. \quad \text{Ans.}$$

( 5 )

$$2000 \times 4,91 \div 100 = \$98,20. \quad \text{Ans.}$$

( 6 )

$$4\frac{1}{2} \text{ per cent.} = \$4,60 \text{ premium on } \$100 ; 1500 \times 4,60 \times 20$$

$$\div 100 = \$1380 ; 1500 - 1380 = \$120. \quad \text{Ans.}$$

( 7 )

$$\$100 \times 2,71 = \$271 \text{ annual premium.}$$

\$271 premium paid at the beginning of the 1st year.

47,425, interest on \$271 2 years 6 months.

271 premium paid at the beginning of the 2d year.

28,455 interest on \$271 1 year 6 months.

271 premium paid at the beginning of the 3rd year.

9,485 interest on \$271 0 year 6 months.

\$898,365 Premiums and interest.

$$10000 - 898,365 = \$9101,635.$$

## ENDOWMENTS AND TAXES.

( 1 )

$$(164,46 \times 250) \div 100 = \$411,15. \text{ Ans.}$$

( 2 )

$$(210,53 \times 360) \div 100 = \$757,908. \text{ Ans.}$$

( 3 )

$$(188,83 \times 650) \div 100 = \$1227,395. \text{ Ans.}$$

( 4 )

$$(376,84 \times 350) \div 100 = \$1318,94. \text{ Ans.}$$

## ANNUITIES.

( 1 )

$$12,821153 \times 550 = \$7051,63415. \text{ Ans.}$$

( 2 )

$$10,83777 \times 835 = \$9049,53795. \text{ Ans.}$$

( 3 )

$$15,372451 \times 1600 = \$23058,6765. \text{ Ans.}$$

( 4 )

$$13,406164 \times 1220 = \$16355,52+. \text{ Ans.}$$

( 5 )

$$27560 \div 12,550358 = \$2195,95. \text{ Ans.}$$

( 6 )

$$25000 \div 11,469921 = \$2179,63 ; 2179,63 - 20 = \$2159,613. \text{ A.}$$

## • TAXES.

( 1 )

$$350 \times 1.50 = \$525; 1465.50 + 350.25 + 200.25 = \$2016;$$

$$2016 - 525 = \$1491; 1490 \div 318200 = .0046 = \frac{23}{50} \text{ per cent.}$$

( 2 )

$$98415 \times .25 = \$24603.75; 100406 - 24603.75 = \$75802.25;$$

$$75802.25 \div .002 = \$37901125. \text{ Ans.}$$

( 3 )

$$56450 \times .25 = \$14112.50 \text{ poll tax; } 87467 - 14112.50$$

$$= \$73354.50; 73354.50 \div 4890300 = .015 = 1\frac{1}{2} \text{ per cent.}$$

$$5400 \times .015 = \$81; 81 + (.25 \times 5 = 1.25) = \$82.25. \text{ Ans.}$$

$$3760.50 \times .015 = \$56.4075; 56.4075 + .50 = \$56.9075. \text{ Ans.}$$

( 4 )

$$40 \times .50 = \$20; 957.50 - 20 = \$937.50; 937.50 \div 125000$$

$$= .0075 = \frac{3}{4} \text{ per cent. Ans.}$$

$$2000 \times .0075 = \$15; 15 + .50 = \$15.50. \text{ Ans.}$$

( 5 )

$$5674.50 \div .975 = \$5820. \text{ Ans.}$$

( 6 )

$$21346.75 \div .96 = \$22236.197 \text{ Ans.}$$

( 7 )

$$4423.2475 \div .95 = \$4656.05 \text{ whole tax to be raised.}$$

$$150 \times .50 = \$75 \text{ poll tax; } 4656.05 - 75 = \$4581.05 \text{ to be}$$

$$\text{raised on taxable property.}$$

$$4581.05 \div 916210 = .005, \text{ or } \frac{1}{2} \text{ per cent. Ans.}$$

$$2100 + 3000 = 5100; 5100 \times .005 = \$25.50; 25.50 +$$

$$1.50 = \$27. \text{ Ans.}$$

$$1275.50 \times .005 = \$6.3775; 6.3775 + .50 = \$6.8775 \text{ G's tax. A.}$$

$$2456 \times .005 = \$12.28; 12.28 + .50 = \$12.78 \text{ H's tax. A}$$

( 8 )

$$2850 \div 190000 = .015, \text{ or } \frac{1}{66} \text{ per cent. } \textit{Ans.}$$

$$7500 \times .015 = \$112.50. \textit{Ans.}$$

$$1200 \times .015 = \$18. \textit{Ans.}$$

( 9 )

$$60 \times 6 = \$360 ; 360 + 66 = \$426 ; 426 - 41.60 = \$384.40 ;$$

$$384.40 \div 7688 = .05 \text{ tax per day ; } 148 \times .05 = \$7.40. \textit{Ans.}$$

$$184\frac{1}{2} \times .05 = \$9.225. \textit{Ans.}$$

## CUSTOM HOUSE BUSINESS.

( 3 )

$$9\text{cwt. } 3\text{qr. } 24\text{lb.} = 999\text{lb.} ; 999 - 146 = 853\text{lb.}$$

$$10\text{cwt. } 2\text{qr. } 12\text{lb.} = 1062\text{lb.} ; 1062 - 150 = 912\text{lb.}$$

$$11\text{cwt. } 1\text{qr. } 24\text{lb.} = 1149\text{lb.} ; 1149 - 158 = 991\text{lb.}$$

$$2756\text{lb.} = 27.56\text{cwt.}$$

$$27.56 \times \$9.47 = \$260.9932. \textit{Ans.}$$

( 4 )

$$6\text{cwt. } 2\text{qr. } 14\text{lb.} = 664\text{lb.} ; 664 - 94 = 570\text{lb.}$$

$$9\text{cwt. } 1\text{qr. } 20\text{lb.} = 945\text{lb.} ; 945 - 100 = 845\text{lb.}$$

$$6\text{cwt. } 2\text{qr. } 22\text{lb.} = 672\text{lb.} ; 672 - 88 = 584\text{lb.}$$

$$7\text{cwt. } 2\text{qr. } 24\text{lb.} = 774\text{lb.} ; 774 - 89 = 685\text{lb.}$$

$$8\text{cwt. } 0\text{qr. } 13\text{lb.} = 813\text{lb.} ; 813 - 100 = 713\text{lb.}$$

$$\underline{3397\text{lb.}}$$

$$3397 \times .21 = \$713.37. \textit{Ans.}$$

( 5 )

$$8\text{cwt. } 3\text{qr. } 14\text{lb.} = 8.89\text{cwt.} ; 8.89 \times 18 = 160.02\text{cwt.} ;$$

$$160.02\text{cwt.} \times 16 = 2560.32\text{lb.} = 25.6032\text{cwt.} ; 160.02 - 25.6032$$

$$= 134.4168\text{cwt.} = 6\text{ T. } 14\text{cwt. } 1\text{qr. } 16.68\text{lb. } \textit{Ans.}$$

( 6 )

$$4 T. 3qr. = 83.75cwt. ; 83.75 \times 20 = 1675lb. = 16.75cwt. ; \\ 83.75 - 16.75 = 67cwt. = 3 T. 7cwt. \quad Ans.$$

( 7 )

$$7 T. 11cwt. 3qr. = 151.75cwt. ; 151.75 \times 12 = 1821lb. \\ = 18.21cwt. ; 151.75 - 18.21 = 133.54cwt. ; \\ 133.54 \times 2,31 = \$308,4774. \quad Ans.$$

( 8 )

$$19cwt. 1qr. 24lb. = 1949lb. ; 1949 - 149 = 1800lb. = 18cwt. , \\ 18 \times 24.28 = \$437,04 ; \\ 12cwt. 3qr. 19lb. = 1294lb. ; 1294 - 49 = 1245lb. = 12.45cwt. \\ 12.45 \times 28.56 = \$355,572 ; 437,04 + 355,572 = \$792,612. \quad A.$$

( 9 )

$$10cwt. 1qr. 14lb. = 10.39cwt. ; 10.39 \times 17\frac{1}{4} = 179.2275cwt., \text{ or } \\ 17922.75lb. ; 7 + 4 = 11lb. ; 179.2275 \times 11 \\ = 1971.5025lb. \text{ draft and tare. } \\ 17922.75 - 1971.5027 = 15951.2475lb. = 159.512475cwt. ; \\ 159,512475 \times \$7,50 = \$1196,343 +. \quad Ans.$$

( 10 )

$$3cwt. 3qr. 14lb. = 3.89cwt. ; 3.89 \times 29 = 112.81cwt., \text{ or } 11281lb. ; \\ 8 + 4 = 12lb. \text{ draft and tare ; } 112.81 \times 12 = 1353,72 ; \\ 11281 - 1353,72 = 9927.28lb. = 99,2728cwt. ; 99.2728 \times 7,50 \\ = 744,546. \quad Ans.$$

( 11 )

$$4cwt. 3qr. 14lb. = 4.89cwt. ; 4.89 \times 7 = 34.23cwt. ; \\ 34.23 \times 7 = 239.61lb. \text{ draft ; } 8 \times 7 = 56lb. \text{ tare ; } 239.61 + 56 + \\ 99.75 = 395.36lb. ; 3423 - 395.36 = 3027.64lb. = 30.2764cwt. ; \\ 30.2764 \times 8,45 = \$255,835 +. \quad Ans.$$

( 12 )

$$\begin{aligned}
 &22,50 + 12,49 + 5,11 + 1,31 = \$41,41 ; 11\text{cwt. } 1\text{qr. } 15\text{lb.} \\
 &= 11.40\text{cwt.}, \text{ or } 1140\text{lb.} ; 11.40 \times 11\frac{1}{2} = 127.68\text{lb. tare} ; 1140 - \\
 &127.68 = 10.1232\text{cwt.} \\
 &41,41 \div 10.1232\text{cwt.} = \$4,09 +. \quad \text{Ans.}
 \end{aligned}$$

( 13 )

$$\begin{aligned}
 &3\text{cwt. } 2\text{qr. } 14\text{lb.} = 3.64\text{cwt.}, \text{ or } 364\text{lb.} ; 3.64 \times 7 = 25.48\text{cwt.} ; \\
 &25.48 \times 21 = 535.08\text{lb.} ; 2548 - 535.08 = 2012,92 ; \\
 &2012,92 \times 6\frac{1}{4} = \$125,8075. \quad \text{Ans.}
 \end{aligned}$$

( 14 )

$$\begin{aligned}
 &87 \times 47 = 4089\text{gal.} ; 4089 \times 9 = 36801\text{lb.} ; 36801 \div 11 \\
 &= 3345,5454 + \text{tare} ; 36801 - 3345,5454 = 33455,4546\text{lb.} \\
 &= 334,55454\text{cwt.} + ; 334,55454 \times 1,19 = \$398,1199. \quad \text{Ans.}
 \end{aligned}$$

( 15 )

$$\begin{aligned}
 &13\text{cwt. } 1\text{qr. } 12\text{lb.} = 1337\text{lb.} ; 1337 \times 5 = 6685\text{lb.}, \text{ or } 66.85\text{cwt.} ; \\
 &1\frac{1}{2} + 5\frac{1}{2} = 7\text{lb.} ; 66.85 \times 7 = 467.95\text{lb.} ; 6685 - 467,95 \\
 &= 6217.05\text{lb. nett weight} ; 6217.05 \times .07\frac{1}{2} = \$466,278 +. \quad \text{Ans.}
 \end{aligned}$$

( 16 )

$$\begin{aligned}
 &450 \times 76 = 34200\text{lb.} ; 34200 \times .08 = 2736\text{lb. tare} ; 34200 - 2736 \\
 &= 31464\text{lb. nett weight} ; 31464 \times .10\frac{1}{2} = \$3303,72 \text{ cost} ; \\
 &3303,72 \times .33\frac{1}{2} = \$1101,24 \text{ whole gain} ; 3303,72 + 1101,24 \\
 &= \$4404,96 ; 4404,96 \div 31464 = .14 \text{ cents per pound, the} \\
 &\text{selling price.} \quad \text{Ans.}
 \end{aligned}$$

( 17 )

$$\begin{aligned}
 &176 \times 46\frac{1}{4} = 8140\text{yd.} ; 8140 \times 3,25 = \$26455 ; 26455 \times .30 \\
 &= \$7936,50 \text{ duty.} \quad \text{Ans.}
 \end{aligned}$$

( 18 )

$$\begin{aligned}
 &54\text{ T. } 13\text{cwt. } 3\text{qr. } 20\text{lb.} = 54.6975 \text{ tons} ; 54.6975 \times 45 \\
 &= \$2461,3875 \text{ cost} ; 2461,3875 \times .33\frac{1}{2} = \$820,4625 \text{ duty.} \quad \text{Ans.}
 \end{aligned}$$

( 19 )

$$\begin{aligned} 3. \times 63 &= 189 \text{ gal.} ; 189 \times .02 = 3.78 \text{ gal. leakage} ; \\ 189 - 3.78 &= 185.22 \text{ gal.} ; 185.22 \times .35 = \$64,827 \text{ cost} ; \\ 64,827 \times .25 &= \$16,206 + \text{ duty. } \textit{Ans.} \end{aligned}$$

( 20 )

$$\begin{aligned} 140 \times 50 &= 7000 \text{ lb.} = 70 \text{ cwt.} ; 70 \times 10 = 700 \text{ lb. tare} ; \\ 7000 - 700 &= 6300 \text{ lb.} ; 6300 \times .60 = \$3780 \text{ cost} ; \\ 3780 \times .40 &= \$1512 \text{ duty. } \textit{Ans.} \end{aligned}$$

( 21 )

$$\begin{aligned} 225 \times 160 &= 36000 \text{ lb.} ; 36000 \times .02 = 720 \text{ tare} ; \\ 36000 - 720 &= 35280 \text{ lb.} ; 35280 \times .06 = \$2116.80 \text{ cost} ; \\ 2116.80 \times .20 &= \$423.36 \text{ duty. } \textit{Ans.} \end{aligned}$$

( 22 )

$$\begin{aligned} 275 \times 2\frac{1}{4} &= 756.25 \text{ gal.} ; 756.25 \times .05 = 37.8125 \text{ tare} ; 756.25 \\ &- 37.8125 = 718.4375 \text{ gal.} ; 718.4375 \times .35 \\ &= \$251,453 + \text{ duty. } \textit{Ans.} \end{aligned}$$

( 23 )

$$\begin{aligned} 175 \times 196 &= 34300 \text{ lb.} ; 34300 \times .15 = 5145 \text{ lb. tare} ; \\ 34300 - 5145 &= 29155 \text{ nett weight} ; \\ 29155 \times .05 &= \$1457.75 \text{ duty. } \textit{Ans.} \end{aligned}$$

( 24 )

$$\begin{aligned} 2 \text{ cwt. } 2 \text{ qr. } 24 \text{ lb.} &= 2.74 \text{ cwt.} ; 2.74 \times 75 = 205.5 \text{ cwt.} ; 205.5 \times .11 \\ &= 22.605 \text{ tare} ; 205.5 - 22.605 = 182.895 \text{ cwt. nett weight} ; \\ 182.895 \times .01\frac{1}{4} &= \$342,928 ; 342,928 \times .20 \\ &= \$68,5856 \text{ duty. } \textit{Ans.} \end{aligned}$$

## EQUATION OF PAYMENTS.

( 1 )

$$\begin{array}{r}
 200 \times 4 = 800 \\
 400 \times 10 = 4000 \\
 \underline{600 \times 16 = 9600} \\
 1200 \quad 1200)14400(12mo. \quad Ans.
 \end{array}$$

( 2 )

$$\begin{array}{r}
 800 \times 6 = 4800 \\
 600 \times 8 = 4800 \\
 \underline{1000 \times 12 = 12000} \\
 2400 \quad )21600(9mo. \quad Ans.
 \end{array}$$

( 3 )

$$\begin{array}{r}
 750 \times 4 = 3000 \\
 1500 \times 6 = 9000 \\
 \underline{2250 \times 12 = 27000} \\
 4500 \quad )39000(8\frac{2}{3}mo. \quad Ans.
 \end{array}$$

( 4 )

$$\begin{array}{r}
 240 \times 3 = 720 \\
 360 \times 5 = 1800 \\
 \underline{600 \times 10 = 6000} \\
 1200 \quad )8520(7mo. 3da. \quad Ans.
 \end{array}$$

( 5 )

$$\begin{array}{r}
 960 \times 00 = 000 \\
 960 \times 6 = 5760 \\
 960 \times 7 = 6720 \\
 \underline{960 \times 12 = 11520} \\
 3840 \quad )24000(6\frac{1}{4}mo. \quad Ans.
 \end{array}$$



( 6 )

$$150 \times 8 = 1200; 176 \times 8,50 = \$1496; 200 \times 9 = \$1800.$$

$$1200 \times 0 =$$

$$1496 \times 15 = 22440$$

$$1800 \times 40 = 72000$$

$$\begin{array}{r} 4496 \\ \hline \end{array} ) 94440 ( 21 + \text{days. } \textit{Ans.}$$

( 7 )

$$1000 \times 0 =$$

$$1200 \times 3 = 3600$$

$$800 \times 8 = 6400$$

$$1500 \times 10 = 15000$$

$$500 \times 12 = 6000$$

$$\begin{array}{r} 5000 \\ \hline \end{array} ) 31000 ( 6 \text{mo. } 6 \text{da. } \textit{Ans.}$$

( 8 )

$$200 \times 0 =$$

$$150 \times 31 = 4650$$

$$250 \times 45 = 11250$$

$$\begin{array}{r} 600 \\ \hline \end{array} ) 15900 ( 26 \frac{1}{2} \text{da. } \text{July 28th. } \textit{Ans.}$$

( 9 )

$$45 \times 00 =$$

$$100 \times 15 = 1500$$

$$576 \times 35 = 20160$$

$$1050 \times 61 = 64050$$

$$\begin{array}{r} 1771 \\ \hline \end{array} ) 85710 ( 48 \frac{702}{1771} \text{days.}$$

It will fall due on the 19th of September. *Ans.*

( 10 )

*days. days.*

Bought April 1st, Due Dec. 1st,  $4350 \times 00 = 0000$

" May 7th, " Jan. 7th,  $3750 \times 37 = 138750$

" June 5th, " Feb. 5th,  $2550 \times 66 = 168300$

$$\begin{array}{r} 10650 \\ \hline \end{array} ) 306050 ( 28 \frac{157}{10650} \text{da.}$$

The whole would become due in  $28 \frac{157}{10650}$  days from Dec. 1st, or on Dec. 30th.

( 11 )

May 1st.	3 mo.	due August 1st,	$3800 \times 0 = 00000$
June 1st.	3 mo.	due Sept. 1st,	$700 \times 31 = 21700$
" 15th.	4 mo.	due Oct. 15th,	$900 \times 75 = 67500$
July 25th.	6 mo.	due Jan. 25th,	$1000 \times 177 = 177000$
			<u>3400</u>
			<u>)266200</u>
			$78\frac{5}{17}da.$

Due in  $78\frac{5}{17}$ , or 79 days from August 1st: that is, on the 19th day of October.

( 12 )

Jan. 1st,	4mo.,	due May 1st,	$367,20 \times 3 = 1101,60$
" 28th,	3mo.,	due April 28th,	$901,80 \times 0 = 0000,00$
Feb. 24th,	5mo.,	due July 24th,	$826,38 \times 87 = 71895,06$
Mar. 30th,	6mo.,	due Sept. 30th,	$854,88 \times 155 = 132506,40$
May 1st,	4mo.,	due Sept. 1st,	$396,50 \times 126 = 49959,00$
			<u>3346,76</u>
			<u>) 255462,06</u>
			$76\frac{55415}{167338}da.$

The equated time of the above bills reaches the 77th day from April 28th: hence, the equated time falls on that day, which is the 14th of July.

## ALLIGATION.

( 1 )

$$\begin{array}{rcl}
 1 \times .75 & = & .75 \\
 3 \times .50 & = & 1.50 \\
 2 \times .37\frac{1}{2} & = & .75 \\
 6 & \overline{)3.00} & (.50. \text{ Ans.}
 \end{array}$$

( 2 )

$$\begin{array}{rcl}
 1 \times .37\frac{1}{2} & = & .37\frac{1}{2} \\
 1 \times .50 & = & .50 \\
 1 \times .62\frac{1}{2} & = & .62\frac{1}{2} \\
 1 \times .80 & = & .80 \\
 1 \times 1.00 & = & 1.00 \\
 5 & \overline{)3.30} & (.66. \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 (3) \\
 5 \times .60 = 3.00 \\
 3 \times .90 = 2.88 \\
 4 \times .0 = 00 \\
 \hline
 12 \quad ) 5.88 ( 49. \quad \text{Ans.}
 \end{array}$$

$$\begin{array}{r}
 (4) \\
 50 \times .2 = 10.00 \\
 60 \times .90 = 54.00 \\
 36 \times .62\frac{1}{2} = 22.50 \\
 50 \times .39 = 19.50 \\
 \hline
 196 \quad ) 196.00 ( \$1.00. \quad A.
 \end{array}$$

$$\begin{array}{r}
 (5) \\
 1 \times 70 = 70 \\
 1 \times 73 = 73 \\
 1 \times 73\frac{1}{2} = 73\frac{1}{2} \\
 1 \times 77 = 77 \\
 1 \times 70 = 70 \\
 1 \times 80\frac{1}{2} = 80\frac{1}{2} \\
 1 \times 81 = 81 \\
 \hline
 7 \quad ) 525 ( 75. \quad \text{Ans.}
 \end{array}$$

$$\begin{array}{r}
 (6) \\
 1 \times 18 = 18 \\
 1 \times 21 = 21 \\
 1 \times 17 = 17 \\
 1 \times 19 = 19 \\
 1 \times 20 = 20 \\
 \hline
 5 \quad ) 95 ( 19. \quad \text{Ans.}
 \end{array}$$

$$\begin{array}{r}
 (7) \\
 34 \times .05 = 1.70 \\
 102 \times .08 = 8.16 \\
 136 \times .10 = 13.60 \\
 34 \times .12 = 4.08 \\
 \hline
 306 \quad 27.54 \\
 \quad 13.77 \quad 50 \text{ p. ct.} \\
 \quad 27.54 \\
 306 \quad 41.31 ( .13\frac{1}{2}. \quad A.
 \end{array}$$

$$\begin{array}{r}
 (8) \\
 8 \times .30 = 2.40 \\
 11 \times .25 = 2.75 \\
 25 \times .07 = 1.75 \\
 \hline
 44 \quad 6.90 \\
 .15 \quad 6.60 \\
 \hline
 6.60 \quad .30 \text{ loss.} \quad A.
 \end{array}$$

$$\begin{array}{c}
 (1) \\
 12 \left\{ \begin{array}{l} 8 \\ 10 \\ 14 \end{array} \right\} \left| \begin{array}{l} \frac{1}{2} \\ \frac{1}{2} \end{array} \right| \left| \begin{array}{l} \frac{1}{2} \\ \frac{1}{2} \end{array} \right| \left| \begin{array}{l} 1 \\ 2 \end{array} \right| \left| \begin{array}{l} 1 \\ 1 \end{array} \right| \left| \begin{array}{l} 1 \\ 3 \end{array} \right|
 \end{array}$$

1 lb. at 8 cents; 1 lb. at 10 cents; 3 lb. at 14 cents.

$$\begin{array}{c}
 (2) \\
 60 \left\{ \begin{array}{l} 40 \\ 65 \\ 75 \end{array} \right\} \left| \begin{array}{l} \frac{1}{20} \\ \frac{1}{5} \end{array} \right| \left| \begin{array}{l} \frac{1}{20} \\ \frac{1}{5} \end{array} \right| \left| \begin{array}{l} 1 \\ 4 \end{array} \right| \left| \begin{array}{l} 3 \\ 4 \end{array} \right| \left| \begin{array}{l} 4 \\ 4 \end{array} \right|
 \end{array}$$

1 pound of each, smallest number.

$$(3)$$

$$30 \left\{ \begin{array}{l} 10 \\ 25 \\ 40 \\ 50 \end{array} \right\} \left| \begin{array}{l} \frac{1}{20} \\ \frac{1}{20} \end{array} \right| \left| \begin{array}{l} \frac{1}{10} \\ \frac{1}{10} \end{array} \right| \left| \begin{array}{l} 1 \\ 1 \end{array} \right| \left| \begin{array}{l} 2 \\ 1 \end{array} \right| \left| \begin{array}{l} 1 \\ 1 \end{array} \right|$$

1 calf, 2 cows, 1 ox, 1 colt.

$$(4)$$

$$13 \left\{ \begin{array}{l} 0 \\ 14 \\ 15 \end{array} \right\} \left| \begin{array}{l} \frac{1}{13} \\ 1 \end{array} \right| \left| \begin{array}{l} \frac{1}{13} \\ \frac{1}{2} \end{array} \right| \left| \begin{array}{l} 1 \\ 13 \end{array} \right| \left| \begin{array}{l} 2 \\ 13 \end{array} \right| \left| \begin{array}{l} 3 \\ 13 \end{array} \right|$$

3 gallons of water.

$$(1)$$

$$8 \left\{ \begin{array}{l} 4 \\ 6 \\ 10 \\ 12 \end{array} \right\} \left| \begin{array}{l} \frac{1}{4} \\ \frac{1}{2} \\ \frac{1}{2} \end{array} \right| \left| \begin{array}{l} 1 \\ 1 \\ 1 \end{array} \right| \left| \begin{array}{l} 1 \\ 1 \\ 1 \end{array} \right| \left| \begin{array}{l} 20 \\ 20 \\ 20 \\ 20 \end{array} \right|$$

20 pounds of each kind.

$$(2)$$

$$10 \left\{ \begin{array}{l} 7 \\ 11 \\ 12 \end{array} \right\} \left| \begin{array}{l} \frac{1}{3} \\ \frac{1}{3} \\ \frac{1}{3} \end{array} \right| \left| \begin{array}{l} \frac{1}{3} \\ 1 \\ 3 \end{array} \right| \left| \begin{array}{l} 2 \\ 3 \\ 3 \end{array} \right| \left| \begin{array}{l} 1 \\ 3 \\ 3 \end{array} \right| \left| \begin{array}{l} 75 \\ 75 \\ 75 \end{array} \right|$$

75 pounds of each.

171

$$(3)$$

$$8 \left\{ \begin{array}{l} 7 \\ 7\frac{1}{2} \\ 9 \\ 9\frac{1}{2} \end{array} \right\} \left| \begin{array}{l} 1 \\ 1 \\ \frac{2}{3} \end{array} \right| \left| \begin{array}{l} 2 \\ 1 \\ 2 \end{array} \right| \left| \begin{array}{l} 3 \\ 3 \\ 2 \end{array} \right| \left| \begin{array}{l} 3 \\ 2 \\ 1 \\ 2 \end{array} \right| \left| \begin{array}{l} 36 \\ 24 \\ 12 \\ 24 \end{array} \right|$$

36 gal. at 7s., 24 gal. at 7s 6d. and 9s. 6d., 12 gal. at 9s.

$$(4)$$

$$1\frac{1}{2} \left\{ \begin{array}{l} 2 \\ \frac{3}{2} \end{array} \right\} \left| \begin{array}{l} \frac{4}{3} \\ \frac{4}{3} \end{array} \right| \left| \begin{array}{l} 8 \\ 12 \end{array} \right| \left| \begin{array}{l} 2 \\ 3 \end{array} \right| \left| \begin{array}{l} 10 \\ 15 \end{array} \right|$$

10 at \$2, and 15 at \$2.

$$(5)$$

8 {	5	1	2	2	8	2	25	
	7							
	7½							
	9½							
	10	½	½	2¾	3	1	4	50

$$(1)$$

7 {	5	½	1	1	22
	6				
	8				
	9				
	/	1	1	1	22

$$1+1+1+1=4; 88 \div 4=22.$$

$$(2)$$

2½ {	0	½	4	4	8	2	9
	2½						
	2½						
	3						
	½	12	36	36	12	3	40½

$$2+9+3=14; 63 \div 14=4½.$$

$$(3)$$

1½ {	¾	20	20	220	20	240	4	16
	1½							
	1½							
	1¾							
	20	20	180	180	180	3	12	

*Ans.* 16 lambs, 12 sheep, 12 calves.

$$(4)$$

9 {	6	½	10	10	10	2	8
	7						
	19						
	19						
	10	10	3	2	5	1	4

$$20 \div 5=4; \text{Ans. 4, 8 and 8.}$$

$$(5)$$

5 {	4	1	1	1	5	3	1	9
	6							
	8							
	10							
	1	1	1	1	1	1	1	10

$$9+1+1+1=12; 120 \div 12=10.$$

(6)

$$6 \left\{ \begin{array}{c} 2 \\ 5 \\ 12 \end{array} \right\} \left| \begin{array}{c} \frac{1}{4} \\ \frac{1}{8} \end{array} \right| \left| \begin{array}{c} 1 \\ \frac{1}{8} \end{array} \right| \left| \begin{array}{c} 3 \\ 2 \end{array} \right| \left| \begin{array}{c} 6 \\ 1 \end{array} \right| \left| \begin{array}{c} 3 \\ 3 \end{array} \right| \left| \begin{array}{c} 1 \\ 1 \end{array} \right| \left| \begin{array}{c} 6 \\ 6 \end{array} \right| \left| \begin{array}{c} 12 \\ 6 \end{array} \right|$$

$$1+2+1=4; 24 \div 4=6.$$

(7)

$$17 \left\{ \begin{array}{c} 15 \\ 20 \\ 22 \\ 24 \end{array} \right\} \left| \begin{array}{c} \frac{1}{2} \\ \frac{1}{4} \end{array} \right| \left| \begin{array}{c} \frac{1}{2} \\ \frac{1}{4} \end{array} \right| \left| \begin{array}{c} \frac{1}{2} \\ \frac{1}{4} \end{array} \right| \left| \begin{array}{c} 7 \\ 2 \end{array} \right| \left| \begin{array}{c} 5 \\ 2 \end{array} \right| \left| \begin{array}{c} 3 \\ 2 \end{array} \right| \left| \begin{array}{c} 15 \\ 2 \end{array} \right| \left| \begin{array}{c} 30 \\ 4 \end{array} \right|$$

$$15+2+2+2=21; 42 \div 21=2.$$

(8)

$$2 \left\{ \begin{array}{c} \frac{1}{2} \\ 1 \\ 5 \end{array} \right\} \left| \begin{array}{c} \frac{1}{2} \\ \frac{1}{4} \end{array} \right| \left| \begin{array}{c} 1 \\ \frac{1}{4} \end{array} \right| \left| \begin{array}{c} 2 \\ 1 \end{array} \right| \left| \begin{array}{c} 3 \\ 1 \end{array} \right| \left| \begin{array}{c} 2 \\ 2 \end{array} \right| \left| \begin{array}{c} 10 \\ 15 \end{array} \right| \left| \begin{array}{c} 10 \\ 10 \end{array} \right|$$

$$2+3+2=7; 35 \div 7=5.$$

## EXCHANGE.

(1)

$$8465 \times .01\frac{1}{2} = \$126,975; 8465 + 126,975 = \$8591,975. \text{ Ans.}$$

(2)

$$8746,50 \times .01\frac{1}{4} = \$109,33125; 8746,50 - 109,33125 \\ = \$8637,168+. \text{ Ans.}$$

(3)

$$9876,40 \times .01 = \$98,764; 9876,40 - 98,764 = \$9777,636. \text{ Ans.}$$

(2)

$$£36794.4375 \times .07\frac{1}{2} = £2851.5689+; 36794.4375 + 2851.5689 \\ = £39646.0064; 39646.0064 \times 4.44\frac{1}{2} = \$176204.4729+. \text{ A.}$$

(3)

$$\$4\frac{1}{2} \times .09 = .40 \text{ premium ; } 4,44\frac{1}{2} + .40 = 4.84\frac{1}{2} = 4.84444 + : \\ 67894.25 \div 4.84444 = 14014.88 = \text{£}14014 \text{ } 17s. \text{ } 7d.$$

(4)

$$\text{£}1256.9375 \times .07\frac{1}{2} = \text{£}94.2703 ; 1256.9375 + 94.2703 \\ = \text{£}1351.2078 ; 1351.2078 \times 4.44\frac{1}{2} = \$6005,368. \text{ Ans.}$$

(5)

$$\text{£}364.9333 \times .06\frac{1}{2} = \text{£}30.10699 + ; 364.9333 + 30.10699 \\ = 395.0402 ; 395.0402 \times 4.44\frac{1}{2} = \$1755,734 + ; \\ 1755,734 - 947,86 = \$807,874 +. \text{ Ans.}$$

(2)

$$\$17326,274 \div .186 = 93152.01 + \text{ francs ; } 93152.01 - 86978 \\ = 6174.01 ; 6174.01 \div 86978 = .07 \text{ per cent. } \text{Ans.}$$

(3)

$$18.6 \times .03 = .558 ; 18.6 - .558 = 18.042 \text{ cents.} \\ 68097 \times 18.042 = \$12286,06. \text{ Ans.}$$

(4)

$$\$16785,25 \times 5.04 = 84597 \text{ francs } 66 \text{ centimes. } \text{Ans.}$$

(1)

$$35 \times .02 = .7 ; 35 + .7 = 35.7 \text{ cents ; } 18649 \times 35.7 = \$6657,693.$$

(2)

$$3678 \times .34 = \$1250,52. \text{ Ans. ; } 35 - 34 = .01 ; .01 \div 35 \\ = .03 \text{ per cent. nearly, below par.}$$

## TONNAGE.

(1)

$$(75 - \frac{2}{3} \text{ of } 20) \times 20 \times 17 = 21420 ; 21420 \div 95 = 225\frac{2}{5} \text{ tons. } \text{A.}$$

(2)

$$90ft. \times 22ft. \text{ } 7in. \times 20ft. \text{ } 6ft. = 41666\frac{1}{2}ft. ; 41666\frac{1}{2} \div 95 \\ = 438\frac{1}{2} \text{ tons. } \text{Ans.}$$

( 3 )

$$154ft. \times 30ft. 8in. \times 14ft. 8in. = 69265\frac{1}{5}ft.; 69265\frac{1}{5} \div 95 \\ = 729\frac{27}{85} \text{ tons. } Ans.$$

( 4 )

$$25ft. 6in. \div 2 = 12ft. 9in. \text{ half the depth.} \\ 103ft. - 15.3ft. = 87.7ft.; 87.7 \times 25.5 \times 12.75 = 28513.4625ft.; \\ 26513.4825 \div 95 = 300.14 + \text{ tons. } Ans.$$

( 5 )

$$34 - 4 = 30 \text{ feet.} \\ 125 \times 25.5 \times 30 = 95625ft.; 95625 \div 95 = 1006.57 + \text{ tons.}$$

## INVOLUTION.

( 1 )

$$4^2 = 16. \text{ } Ans.$$

( 2 )

$$(15)^2 = 225. \text{ } Ans.$$

( 3 )

$$(26)^2 = 676. \text{ } Ans.$$

( 4 )

$$(142)^2 = 20164. \text{ } Ans.$$

( 5 )

$$(468)^2 = 214869. \text{ } Ans.$$

( 6 )

$$(1340)^2 = 1795600. \text{ } Ans.$$

( 7 )

$$(24.6)^2 = 605.16. \text{ } Ans.$$

( 8 )

$$(.526)^2 = .276676. \text{ } Ans.$$

( 9 )

$$(3.125)^2 = 9.765625. \text{ } Ans.$$

( 10 )

$$(.0524)^2 = .00274576. \text{ } Ans.$$

( 11 )

$$(246.25)^2 = 60639.0625. \text{ } Ans.$$

( 12 )

$$(\frac{7}{8})^2 = \frac{49}{64}. \text{ } Ans.$$

( 13 )

$$(\frac{5}{7})^2 = \frac{25}{49}. \text{ } Ans.$$

( 14 )

$$(\frac{7}{9})^2 = \frac{49}{81}. \text{ } Ans.$$



$$(15) \\ \left(\frac{3}{4}\right)^2 = \frac{9}{16}. \text{ Ans.}$$

$$(16) \\ \left(\frac{5}{8}\right)^2 = \frac{25}{64}. \text{ Ans.}$$

$$(17) \\ \left(\frac{5}{8}\right)^2 = \frac{25}{64}. \text{ Ans.}$$

$$(18) \\ (2\frac{4}{5})^2 = (2.8)^2 = 7.84. \text{ Ans.}$$

$$(19) \\ (7\frac{5}{8})^2 = (7.625)^2 = 58.140625. \text{ Ans.}$$

$$(20) \\ (15\frac{9}{11})^2 = (14\frac{4}{11})^2 = \frac{2025}{121} = 16.7355. \text{ Ans.}$$

$$(21) \\ (225\frac{9}{10})^2 = (225.9)^2 = 51030.81. \text{ Ans.}$$

$$(22) \\ 9^2 = 81. \text{ Ans.}$$

$$(23) \\ (24)^3 = 13824. \text{ Ans.}$$

$$(24) \\ (72)^3 = 373248. \text{ Ans.}$$

$$(25) \\ (125)^3 = 1953125. \text{ Ans.}$$

$$(26) \\ (136)^3 = 2515456. \text{ Ans.}$$

$$(27) \\ 12^4 = 20736. \text{ Ans.}$$

$$(28) \\ 9^5 = 59049. \text{ Ans.}$$

$$(29) \\ (4.25)^3 = 76.765625. \text{ Ans.}$$

$$(30) \\ (1.8)^4 = 10.4976. \text{ Ans.}$$

$$(31) \\ (32.4)^3 = 34012.224. \text{ Ans.}$$

$$(32) \\ (.45)^5 = .0184528125. \text{ Ans.}$$

$$(33) \\ \left(\frac{5}{8}\right)^3 = \frac{125}{512}. \text{ Ans.}$$

$$(34) \\ \left(\frac{5}{8}\right)^3 = \frac{125}{512}. \text{ Ans.}$$

$$(35) \\ \left(\frac{3}{8}\right)^4 = \frac{81}{4096}. \text{ Ans.}$$

( 36 )

$$(14\frac{2}{3})^3 = (\frac{44}{3})^3 = \frac{85184}{27} = 3154\frac{26}{27}. \text{ Ans.}$$

( 37 )

$$(2\frac{1}{4})^5 = (\frac{5}{2})^5 = 57\frac{625}{1024}. \text{ Ans.}$$

( 38 )

$$(\frac{25}{37})^4 = \frac{390625}{1871391}. \text{ Ans.}$$

( 39 )

$$(24\frac{3}{4})^3 = (24.6)^3 = 14886.936. \text{ Ans.}$$

( 40 )

$$(.25)^6 = .000244140625. \text{ Ans.}$$

( 41 )

$$(142.5)^3 = 2893640.625. \text{ Ans.}$$

( 42 )

$$(3.205)^2 = 10.272025. \text{ Ans.}$$

## SQUARE ROOT.

( 1 )

$$\sqrt{49} = 7. \text{ Ans.}$$

( 2 )

$$\sqrt{144} = 12. \text{ Ans.}$$

( 3 )

$$\sqrt{225} = 15. \text{ Ans.}$$

( 4 )

$$\sqrt{2304} = 48. \text{ Ans.}$$

( 5 )

$$\sqrt{\frac{36}{81}} = \frac{6}{9}. \text{ Ans.}$$

( 6 )

$$\sqrt{\frac{225}{2304}} = \frac{15}{48}. \text{ Ans.}$$

( 7 )

$$\sqrt{.0196} = .14. \text{ Ans.}$$

( 8 )

$$\sqrt{6.25} = 2.5. \text{ Ans.}$$

( 9 )

$$\sqrt{278.89} = 16.7. \text{ Ans.}$$

( 10 )

$$\sqrt{6275025} = 2505. \text{ Ans.}$$

( 11 )

$$\sqrt{7994}=89.409+. \text{ Ans.}$$

( 12 )

$$\sqrt{205209}=453. \text{ Ans.}$$

( 13 )

$$\sqrt{\frac{1}{4}}=\sqrt{.25}=.5+. \text{ Ans.}$$

( 14 )

$$\sqrt{\frac{15}{8}}=\sqrt{.9375}=.9682+. \text{ A.}$$

( 15 )

$$\sqrt{\frac{1}{16}}=\sqrt{.0625}=.25+. \text{ A.}$$

( 16 )

$$\sqrt{.60794}=.779+. \text{ A.}$$

( 17 )

$$\sqrt{.022201}=.149. \text{ Ans.}$$

( 18 )

$$\sqrt{25.1001}=5.01. \text{ Ans.}$$

( 19 )

$$\sqrt{196.425}=14.015+. \text{ Ans.}$$

( 20 )

$$\sqrt{1.5}=1.2247+. \text{ Ans.}$$

( 21 )

$$\sqrt{\frac{289}{121}}=\frac{17}{11}. \text{ Ans.}$$

( 22 )

$$\sqrt{\frac{9}{16}}=\frac{3}{4}. \text{ Ans.}$$

( 23 )

$$\sqrt{\frac{2}{25}}=\sqrt{.08}=.2828+. \text{ Ans.}$$

( 24 )

$$\sqrt{135}=11.618+. \text{ Ans.}$$

( 25 )

$$\sqrt{19000}=137.84. \text{ Ans.}$$

( 26 )

$$\sqrt{.784}=.885+. \text{ Ans.}$$

( 27 )

$$\sqrt{5647.5225}=75.15. \text{ Ans.}$$

( 28 )

$$\sqrt{160048.0036}=400.06. \text{ A.}$$

( 1 )

$$(50)^2-(40)^2=900; \sqrt{900}=30\text{ft.} \text{ Ans.}$$

( 1 )

$$\sqrt{117649}=343. \text{ Ans.}$$

( 2 )

$$\sqrt{48841}=221 \text{ stones.}$$

( 3 )

$$\begin{aligned}
 810 \times 10 &= 8100 \text{ sq. ft. area of garden;} \\
 \sqrt{8100} &= 90 \text{ ft. length of one side;} \\
 90 \times 4 &= 360 \text{ ft. length of four sides;} \\
 360 \div 16\frac{1}{2} &= 21\frac{2}{11} \text{ rods.}
 \end{aligned}$$

( 4 )

$$\begin{aligned}
 67A. 2R. &= 10800 \text{ sq. rd.}; 10800 \div 3 = 3600; \sqrt{3600} = 60 \text{ rods} \\
 &\text{wide}; 60 \times 3 = 180 \text{ rods long.}
 \end{aligned}$$

( 5 )

$$\begin{aligned}
 3200 \div 2 &= 1600 \text{ number of trees in half the field.} \\
 \sqrt{1600} &= 40 \text{ number of trees in width.} \\
 40 \times 2 &= 80 \text{ number of trees in length.} \\
 (80-1) \times 12 &= 948 \text{ feet long;} & 948 \times 468 &= 443664 \text{ sq. ft.} \\
 (40-1) \times 12 &= 468 \text{ feet wide;} \\
 443664 \text{ sq. ft.} &= 10A. 0R. 29P. 168\frac{3}{4} \text{ sq. ft. area of the field.}
 \end{aligned}$$

( 6 )

$$(45)^2 + (60)^2 = 5625; \sqrt{5625} = 75 \text{ ft. Ans.}$$

( 7 )

$$(225)^2 - (180)^2 = 18225; \sqrt{18225} = 135 \text{ feet high. Ans.}$$

( 8 )

$$\begin{aligned}
 (65)^2 - (49)^2 &= 1824; \sqrt{1824} = 42.708 \text{ ft.} \\
 (65)^2 - (39)^2 &= 2704; \sqrt{2704} = 52. \\
 &94.708 \text{ ft. width of street.}
 \end{aligned}$$

( 9 )

$(120)^2 + (40)^2 = 16000$ ;  $\sqrt{16000} = 126.49 +$ ;  
and since similar triangles have their like sides  
proportional,

$120 : 126.49 :: 63.245 : 66.66\frac{2}{3}$ , the part  
broken off.

$120 - 66.66\frac{2}{3} = 53.33\frac{1}{3}$ , height of stump.



( 10 )

$5^2 + 5^2 = 50$ ;  $\sqrt{50} = 7.0716 +$  distance from corner to corner on  
the surface;  $(7.0716 +)^2 + 5^2 = 75$ ;

$\sqrt{75} = 8.66 + ft.$  *Ans.*

( 11 )

$10 \times 24 \times 2 = 480$ ;  $14 \times 24 \times 2 = 672$  miles.

$(480)^2 + (672)^2 = 681984$ ;  $\sqrt{681984} = 825.8$  miles

( 12 )

10 acres =  $1600 sq. rd.$ ;  $\sqrt{1600} = 40 rd.$ , one equal side of a  
square;  $40 \times 4 = 160$  rods will fence the square;  $160 \times 2,50 =$   
\$400, cost of fencing the square.

$1600 \div 4 = 400 sq. rd.$ , one-fourth the area of the rectangle;  
 $\sqrt{400} = 20$  rods, width of rectangle;  $20 \times 4 = 80$  rods, length;  
 $(80 \times 2) + (20 \times 2) = 200$  rods will fence the rectangle;  $200 \times$   
 $2,50 = \$500$ , cost of fencing the rectangle;  $500 - 400 = \$100$   
difference. *Ans.*

( 13 )

$1 : 9 :: 25^2 : x^2 = 5625$ ;  $\sqrt{5625} = 75 ft.$  *Ans.*

( 14 )

$120 : 1500 :: 8^2 : x^2 = 800$ ;  $\sqrt{800} = 28.28 + ft.$  *Ans.*

( 15 )

$400 : 1600 :: 3^2 : x^2 = 36$ ;  $\sqrt{36} = 6$  inches. *Ans.*

( 16 )

$2\frac{1}{2}$  acres = 400 *sq. rd.*;  $400 \div .7854 = 509.295923 +$  ;  
 $\sqrt{509.295923 +} = 22.5677$  *rd.*, diameter of the piece of ground ;  
 $22.567 \div 2 = 11.283$  rods distance from the center to the  
 circumference;  $4$  *ft.* = .242 + rods ;  $11.283 - .242 = 11.041$  rods.

( 17 )

The grindstone is a cylinder whose base is either of the two side circles, and altitude the thickness of the stone. After the first third is ground off, the remainder is a cylinder whose altitude is the thickness of the stone, and base two-thirds that of the largest circle ; and these cylinders having the same altitude, are to each other as their bases.

As two similar figures are to each other as the squares of their like dimensions, two circles are to each other as the squares of their diameters or radii ; that is, the square of the radius of the second circle will be two-thirds the square of the largest radius, and the square of the radius of the inner circle will be one-third the square of the largest.

Then,  $(24)^2 = 576$  ;  $576 \div 3 = 192$  *sq. in.* ;  $576 - 192 = 384$ , the square of the middle radius ; and  $\sqrt{384} = 19.595$  = the radius of what is left after the first has ground off his share ;  $24 - 19.595 = 4.405$  *in.*, the thickness of the first share.

Also,  $384 - 192 = 192$  ;  $\sqrt{192} = 13.856$  *in.* +, the inner radius ;  $19.595 - 13.856 = 5.739$  *in.*, the thickness of the second share ; and, 13.856, already found, is the thickness of the third share.

## CUBE ROOT.

( 1 )

$$\sqrt[3]{1728} = 12. \text{ Ans.}$$

( 2 )

$$\sqrt[3]{117649} = 49. \text{ Ans.}$$

( 3 )

$$\sqrt[3]{46656} = 36. \text{ Ans.}$$

( 4 )

$$\sqrt[3]{15069223} = 247. \text{ Ans.}$$

(5)

$$\sqrt[3]{5735339} = 179. \text{ Ans.}$$

(6)

$$\sqrt[3]{48228544} = 364. \text{ Ans.}$$

(7)

$$\sqrt[3]{84604519} = 439. \text{ Ans.}$$

(8)

$$\sqrt[3]{28991029248} = 3072. \text{ Ans.}$$

(1)

$$\sqrt[3]{8.343} = 2.028 +. \text{ Ans.}$$

(2)

$$\sqrt[3]{1728.729} = 12.0016 +. \text{ Ans.}$$

(3)

$$\sqrt[3]{.0125} = .232 +. \text{ Ans.}$$

(4)

$$\sqrt[3]{19683.46656} = 27.0002 +. \text{ Ans.}$$

(5)

$$\sqrt[3]{.387420489} = .729 +. \text{ Ans.}$$

(6)

$$\sqrt[3]{.000003375} = .015. \text{ Ans.}$$

(7)

$$\sqrt[3]{.0066592} = .188 +. \text{ Ans.}$$

(8)

$$\sqrt[3]{81.729} = 4.339 +. \text{ Ans.}$$

(1)

$$\sqrt[3]{\frac{64}{125}} = \frac{4}{5}. \text{ Ans.}$$

(2)

$$\sqrt[3]{\frac{343}{729}} = \frac{7}{9}. \text{ Ans.}$$

(3)

$$\sqrt[3]{31\frac{13}{27}} = \sqrt[3]{\frac{19648}{27}} = 22 = 3\frac{1}{3}. \text{ A.}$$

(4)

$$\sqrt[3]{91\frac{1}{8}} = \frac{9}{2} = 4\frac{1}{2}. \text{ Ans.}$$

(5)

$$\sqrt[3]{\frac{343}{125}} = \frac{7}{5}. \text{ Ans.}$$

(6)

$$\sqrt[3]{\frac{729}{15625}} = \frac{9}{25}. \text{ Ans.}$$

(7)

$$\sqrt[3]{\frac{19683}{269144}} = 2\frac{1}{4}. \text{ Ans.}$$

(8)

$$\sqrt[3]{\frac{132674}{12515}} = 2\frac{1}{5}. \text{ Ans.}$$

(9)

$$\sqrt[3]{7\frac{6}{7}} = \sqrt[3]{\frac{54}{7}} = 1.987 +. \text{ Ans.}$$

(10)

$$\sqrt[3]{56\frac{3}{8}} = 3.83 +. \text{ Ans.}$$

( 1 )

$$\sqrt[3]{19683}=27 \text{ feet each way. } \textit{Ans.}$$

( 2 )

$$\sqrt[3]{6859}=19\text{ft.}, \text{ length of each side ;}$$

$$(19)^2 \times 6 = 2166\text{sq. ft.}, \text{ area of the whole surface.}$$

( 3 )

$$\sqrt[3]{46656}=36\text{ft. long ; } (36)^2=1296\text{sq. ft.}, \text{ area of one side.}$$

( 4 )

$$150 \times 31\frac{1}{2} = 4725\text{gal. ; } 4725 \times 231 = 1091475 \text{ c. in.}$$

$$= 631.640 + \text{c. ft. ; } \sqrt[3]{631.640} = 8.57 + \text{ft.}, \text{ length of one side.}$$

( 5 )

$$1500 \div 2 = 750\text{bu. ; } 750 \times 2150.4 = 1612800 \text{ c. in.}$$

$$= 933.333333 + \text{c. ft. ; } \sqrt[3]{933.333333} + = 9.77 + \text{ft.}, \text{ length}$$

$$\text{and breadth ; } 9.77 \times 2 = 19.54 + \text{ feet high.}$$

( 6 )

$$27 \text{ c. ft.} \div 2 = 13.5 \text{ c. ft.} = \text{half a cubic yard ; half a yard in}$$

$$\text{length} = 1.5\text{ft. ; } (1.5)^3 = 3.375 \text{ c. ft. ; } 13.5 - 3.375$$

$$= 10.125 \text{ c. ft. } \textit{Ans.}$$

( 7 )

$$\$911.25 = 91125 \text{ cents ; } \sqrt[3]{91125} = 45 \text{ cents, what he paid per}$$

$$\text{yard ; } 91125 \div 45 = 2025, \text{ whole number of yards.}$$

( 9 )

$$(2.5)^3 : 5^3 :: 8 : x = 64 \text{ pounds. } \textit{Ans.}$$

( 10 )

$$4^3 = 64 \text{ c. ft. ; } 64 \times 8 = 512 \text{ c. ft.}, \text{ contents of larger bin ;}$$

$$\sqrt[3]{512} = 8\text{ft.}, \text{ length of one side of larger bin.}$$



( 11 )

$$6^3 : 12^3 :: 1 : x = 8 \text{ globes. } \textit{Ans.}$$

( 12 )

$$1^3 : (5.5)^3 :: 8 : x = \$1331. \textit{Ans.}$$

( 13 )

$$100 : 800 :: 6^3 : x^3 = 1728 ; \sqrt[3]{1728} = 12 \text{ in. long.}$$

$$100 : 800 :: 3^3 : x^3 = 216 ; \sqrt[3]{216} = 6 \text{ in. wide.}$$

$$100 : 800 :: .5^3 : x^3 = 1 ; \sqrt[3]{1} = 1 \text{ in. thick.}$$

( 14 )

$$3 : 24 :: 12^3 : x^3 = 13824 ; \sqrt[3]{13824} = 24 \text{ ft. long.}$$

$$3 : 24 :: 10^3 : x^3 = 8000 ; \sqrt[3]{8000} = 20 \text{ ft. wide.}$$

$$3 : 24 :: (4.5)^3 : x^3 = 729 ; \sqrt[3]{729} = 9 \text{ ft. deep.}$$

( 15 )

$$2 : 16 :: 10^3 : x^3 = 8000 ; \sqrt[3]{8000} = 20 \text{ feet. } \textit{Ans.}$$

( 16 )

$6^3 = 216 \text{ c. in.}$  ;  $216 \div 4 = 54$  ;  $216 - 54 = 162$  ;  $\sqrt[3]{162} = 5.45 +$ ,  
diameter of what remains after the first woman receives her  
share ;

$6 - 5.45 = .54 \text{ in.}$ , the first woman's share ;

$162 - 54 = 108$  ;  $\sqrt[3]{108} = 4.76 +$  ;  $5.45 - 4.76 = .69 \text{ in.}$ , what  
the second woman had ;

$108 - 54 = 54$  ;  $\sqrt[3]{54} = 3.77 +$  ;  $4.76 - 3.77 = .99 \text{ in.}$ , what the  
third woman had ;

$\sqrt[3]{54} = 3.77 \text{ in.}$ , what the fourth woman had.

## ARITHMETICAL PROGRESSION.

( 1 )

$$(18-1) \times 5 = 85; 85 + 4 = 89. \text{ Ans.}$$

( 2 )

$$(12-1) \times 20 = 220; 300 - 220 = \$80. \text{ Ans.}$$

( 3 )

$$(15-1) \times 14 = 196; 196 + 200 = \$396. \text{ Ans.}$$

( 4 )

0 = first term.

$$\frac{1}{2} = \text{com. diff.} \quad (35 - 0) \times \frac{1}{2} = 17\frac{1}{2}; 17\frac{1}{2} + 0 = 17\frac{1}{2} \text{ rds. A.}$$

35 = No. of terms.

( 5 )

If he brings the farthest marble first, he will travel 300 feet, which will be the first term of a decreasing arithmetical progression, of which the number of terms is 100. Since the marbles are half a foot apart, the common difference will be 1; hence,

$300 - 99 \times 1 = 201$ , the last term, or the distance he must travel to bring the nearest marble.

( 1 )

The first term of the progression is 0, and there are 16 terms.

$$75 - 0 = 75; 75 \div (16 - 1) = 5, \text{ com. diff.}$$

( 2 )

$$26\frac{1}{2} - \frac{1}{2} = 26; 26 \div (14 - 1) = \$2, \text{ com. diff. Ans.}$$

( 3 )

$$14\frac{1}{2} - 2\frac{1}{2} = 12 \text{ in.}; 12 \div (17 - 0) = \frac{4}{3} \text{ in. com. diff. Ans.}$$

( 1 )

$$(100 + 5) = 105; 105 \times 26 = 2730. \text{ Ans.}$$

9

( 2 )

$$(56-1) \times 4 = 220; 220 + 6 = 226 \text{ last term;} \\ (226 + 6) \times 28 = \$64,96. \text{ Ans.}$$

( 3 )

$$\frac{1}{4} = \text{com. diff.}; (30-1) \times \frac{1}{4} = 7\frac{1}{4}; 30 - 7\frac{1}{4} = 22\frac{3}{4} \text{ last term;} \\ 22\frac{3}{4} + 30 = 52\frac{3}{4}; 52\frac{3}{4} \times 15 = 791\frac{1}{4} \text{ miles. Ans.}$$

( 4 )

6 yards = the distance of the first stone from the heap : consequently,  $2 \times 6$  yards = 12 yards = the distance to bring the first stone : hence, 12 = the first term of the progression ; and  $1\frac{1}{4} \times 2 = 2\frac{1}{2}$  = the common difference, and 120 = the number of terms.

$$\text{Then, } 2\frac{1}{2} \times 119 + 12 = 309\frac{1}{2} = \text{last term.}$$

$$(309\frac{1}{2} + 12) \times (120 \div 2) = 321\frac{1}{2} \times 60 = 19290 \text{ yards.}$$

$$19290 \text{ yds} = 10 \text{ mi. } 7 \text{ fur. } 27 \text{ rd. } 1\frac{1}{2} \text{ yd.}$$

( 1 )

$$(500 - .50) \div .09 = 5550; 5550 + 1 = 5551 \text{ bu. Ans.}$$

( 2 )

$$(33-15) \div 1\frac{1}{2} = 12; 12+1 = 13, \text{ number of terms;} \\ (33+15) \times (13 \div 2) = 312 \text{ miles, sum of all the terms.}$$

( 3 )

$$(575-200) \div 75 = 5; 5+1 = 6, \text{ number of instalments. Ans.}$$

## GEOMETRICAL PROGRESSION.

( 2 )

$$5^8 = 390625; 390625 \times 8 = 3125000. \text{ Ans.}$$

( 3 )

$$\left(\frac{1}{2}\right)^9 = \frac{1}{512}; \frac{1}{512} \times 729 = \frac{729}{512}. \text{ Ans.}$$

(4)

$$(10)^{14} \times 1 = \$100000000000000. \text{ Ans.}$$

(5)

$$(2)^5 \times 100 = \$3200. \text{ Ans.}$$

(6)

His capital will treble three times in twelve years; hence,

3 = ratio, and 4 = number of terms.

$$3^4 \times 2000 = \$54000. \text{ Ans.}$$

(7)

2 = ratio, and 16 = number of terms.

$$2^{16} = 32768 \text{ cents} = \$327.68. \text{ Ans.}$$

(1)

$$(78722 \times 3) - 4 = 236162; 236162 \div 2 = 118081. \text{ Ans.}$$

(2)

$$1024 - (4 \times \frac{1}{2}) = 1022; 1022 \div (1 - \frac{1}{2}) = 2044. \text{ Ans.}$$

(3)

4 = ratio, and 12 = number of terms.

$$4^{11} \times 2 = 8388608, \text{ last term.}$$

$$(8388608 \times 4) - 2 = 33554430; 33554430 \div (4 - 1) \\ = \$11184810, \text{ last payment.}$$

(4)

2 = ratio, and 32 = number of terms.

$$(2^{31} \times 2) - 1 = 4294967295 \text{ cents} = \$42949672.95. \text{ Ans.}$$

(5)

$$2 = \text{ratio, and 1 the first term; } 2^{63} \times 1 = 9223372036854775808,$$

$$\text{last term; } (9223372036854775808 \times 2) - 1$$

= 184467440737091551615 grams, sum of all the terms, which divided by 7680 gives 2401919801264264 pints, which reduced gives 37529996894754 bushels; this divided by 40 and 1000 gives 938249922 ships, and a small remainder.

## ANALYSIS.

( 24 )

$\frac{5}{8}$  of  $\frac{2}{3} = \frac{5}{12}$  of the ship, worth \$1736;  $(1736 \div 5) \times 12$   
 $= \$4166,40$ , value of the whole ship.

( 25 )

If he travel 1 hour a day, it will take him  $(7\frac{1}{8} \times 14\frac{2}{3})$  days to perform the journey; if he travel  $10\frac{6}{7}$  hours a day, it will take him as many days as  $10\frac{6}{7}$  is contained times in  $(7\frac{1}{8} \times 14\frac{2}{3}) = 9\frac{5}{8}$  days.

2	\$	11
4	\$	77
8	\$	77
		9 $\frac{5}{8}$ days. <i>Ans.</i>

( 26 )

$\frac{1}{3} + \frac{5}{8} = \frac{17}{24}$ ;  $1 - \frac{17}{24} = \frac{7}{24}$ ; then 2 feet is  $\frac{7}{24}$  of the pole;  
 2 is  $\frac{24}{7}$  of 18 times 2 = 36 feet. *Ans.*

( 27 )

$1 - \frac{1}{4} = \frac{3}{4}$  remainder;  $\frac{1}{5}$  of  $\frac{3}{4} = \frac{3}{20}$ ;  $\frac{1}{4} + \frac{3}{20} = \frac{8}{20}$ ;

$1 - \frac{8}{20} = \frac{12}{20} = \frac{3}{5}$ ; hence \$1062 =  $\frac{3}{5}$  of the whole sum;

$(1062 \div 3) \times 5 = \$1770$ , what he had at first.

( 28 )

The first will fill  $\frac{2}{15}$  of it in 1 hour, and the second  $\frac{6}{25}$  of it in 1 hour;  $\frac{2}{15} + \frac{6}{25} = \frac{28}{75}$ , what both will fill in 1 hour.

It will take as many hours to fill the cistern as  $\frac{28}{75}$  is contained times in 1;  $1 \div \frac{28}{75} = 2\frac{19}{28}$  hours. *Ans.*

( 29 )

One yard will cost  $\frac{1}{34}$  of \$9, and 26 yards, 26 times as much as one yard.

$$\begin{array}{r|l} 3 & 4 \quad 13 \\ & 26 \quad 13 \\ \hline & 3 \quad 13,00 \\ & \underline{\phantom{00}} \\ & \$4,334. \end{array} \quad \text{Ans.}$$

( 30 )

$\frac{1}{4}$  of  $\frac{6}{7}$  of  $\frac{7}{8}$  of \$300 = \$50; and  $\frac{1}{2}$  of  $\frac{3}{4}$  of  $10\frac{2}{3}$  = 4 acres.

$$\begin{array}{r|l} 2 & 50 \quad 2 \\ & 1 \\ \hline & \$100. \end{array} \quad \text{Ans.}$$

( 31 )

$$3\frac{1}{2} \times 1\frac{3}{8} : \frac{7}{8} \times x :: 1 : 1.$$

$$\frac{7}{8} \times \frac{11}{8} : \frac{7}{8} \times x :: 1 : 1$$

$$\begin{array}{r|l} 2 & 7 \\ & 11 \\ \hline & 2 \quad 11 \\ & \underline{\phantom{00}} \\ & 5\frac{1}{2} \text{ yards.} \end{array} \quad \text{Ans.}$$

( 32 )

$$7s. 6d. = 1\frac{1}{2}s.; \quad 3s. 9d. = 1\frac{1}{4}s.$$

$$\begin{array}{r|l} 234 & 117 \\ & 15 \\ \hline & 2 \\ & \underline{\phantom{00}} \\ & 117 \text{ pounds.} \end{array} \quad \text{Ans.}$$

( 33 )

3 pipes reduced to quarts multiplied by 2s. 9d. divided by 6s. = \$693.

$$\begin{array}{r|l} & 3 \\ & 2 \\ & 63 \\ & 11 \\ \hline & \$693. \end{array} \quad \text{Ans.}$$

( 34 )

165 yards multiplied by 2s. 6d. divided by 6s. will give the cost of the whole, which divided by 625 pounds will give 11 cents per pound.

$$\begin{array}{r|l} 2 & 11 \\ & 11 \\ \hline 25 & 2 \quad 11 \\ & 625 \\ \hline & 100 \quad 11.00 \\ & \underline{\phantom{00}} \\ & 11 \text{ cents.} \end{array}$$

( 35 )

It will cost 4 times as much to keep  
4 horses as to keep 1 horse, and 21 times  
as much for 3 weeks as for 1 day = \$56.

	4	2	
\$	10	7	
\$	21		
	<hr/>		
	56.		Ans.

( 36 )

$10 \times 14 \times 22\frac{1}{2}$  = whole number of yards,  
which multiplied by 10s. 8d. and divided  
by 6s. will give \$2100.

	10	
\$	14	15
2	45	8
\$	22	
	<hr/>	
	5600.	
	Ans.	

( 37 )

Divide the cost of the sugar by the  
quantity of flour reduced to pounds, which  
will give  $7\frac{1}{2}$  cents.

	2	15	3
5	25	100	
	100	12	
	<hr/>		
	5	36	
	<hr/>		
	0.07 $\frac{1}{2}$ .		Ans.

( 38 )

Multiply the number of quarts in 2  
hogsheads by 1s. 2d. and divide the pro-  
duct by 4s. 8d., which will give \$126.

	2	
\$	63	
	4	
	<hr/>	
	126.	
	Ans.	

( 39 )

$3 \times 24\frac{1}{2}$  = whole number of yards, which  
multiplied by 4s. 6d., and the product di-  
vided by 7s. 6d. gives \$44,10.

		\$
	2	49
5	2	9
	15	2
	<hr/>	
	10	441
	<hr/>	
	44,10.	
	A.	

( 40 )

120 yards of cloth at 6s. 8d. per yard, will cost \$100; and  
76 bushels of rye at 4s. 6d. is worth \$57;  $100 - 57 = \$43$ .

$$\begin{array}{r|l} \$ & 120^5 \\ \$ & 20 \\ \hline & \$100 \end{array}$$

$$\begin{array}{r|l} \$ & 76^{19} \\ \$ & 3 \\ \hline & \$57 \end{array} \quad 100 - 57 = \$43.$$

( 41 )

$21 \times 41 \times 1,75 = \$1506,75$  what he sold the cloth for;  
 $1506,75 - 1260 = \$246,75$  gain. *Ans.*

( 42 )

Since the hour and minute hands are together at 12, and the  
minute hand passes the hour hand 11 times before they are  
together again at 12, the minute hand will be with, and pass  
the hour hand between 5 and 6 in  $\frac{5}{11}$  of 12 hours;  $\frac{5}{11}$  of 12 =  
 $5\frac{5}{11}$  hr. = 5 hr. 27 m. 16  $\frac{4}{11}$  sec. *Ans.*

( 43 )

$(18 \times 15) \div 9 = 30$  sq. yd., area of the floor;  $30 \div \frac{3}{4} = 40$  yd. A.

( 44 )

If the 9 men work 1 hour a day, it will take them 12 times  
as long to build the house, as when they work 12 hours, viz.  
60 months. If they do the same work in 6 months, they must  
work as many hours per day as 6 is contained times in 60,  
which is 10. *Ans.*

( 45 )

B and C do  $\frac{1}{12}$  of the work in 1 day; A, B and C  $\frac{1}{5}$ ;  $\frac{1}{5} - \frac{1}{12}$   
=  $\frac{1}{30}$  what A will do alone in 1 day; it will take A as many  
days to do the whole work as  $\frac{1}{30}$  is contained times in 1;  $1 \div$   
 $\frac{1}{30} = 36$  days. *Ans.*

( 46 )

A can mow  $\frac{1}{3}$  of the field in 1 day; B  $\frac{1}{4}$ , and C  $\frac{1}{5}$  of it; A,  
B and C can mow  $\frac{1}{3} + \frac{1}{4} + \frac{1}{5} = \frac{47}{60}$  in 1 day;  $1 \div \frac{47}{60} = 1\frac{13}{47}$  days,  
the time it will take the three to mow it.



( 47 )

$3+5+7+9=24$ ; The whole must be divided into 24 parts, of which the first must have 3, the second 5, the third 7, and the fourth 9.  $480 \div 24 = 20$ ;  $20 \times 3 = 60$ , the first;  $20 \times 5 = 100$ , the second;  $20 \times 7 = 140$ , the third;  $20 \times 9 = 180$ , the fourth.

( 48 )

A square foot is equal to 144 square inches; the area divided by one dimension will give the other.  $144 \div 8\frac{1}{2} = 16\frac{1}{2} \text{ in.}$  *Ans.*

( 49 )

At the end of 3 months there would be provision enough for 1800 men 9 months, but being reinforced by 600 men, the provision would last 2400 men but  $\frac{3}{4}$  of 9 months, or  $6\frac{3}{4}$  months, and at the end of 4 months from this time there will be provision enough for 2400 men  $2\frac{3}{4}$  months; but being reinforced by 400 men, it would last 2800 men but  $\frac{2}{3}$  of  $2\frac{3}{4} = 2\frac{1}{4}$  months.

( 50 )

$117\frac{1}{2} \times 3\frac{1}{2} = \$411.25$ , cost of broadcloth;  $488.80 - 411.25 = \$77.55$ , cost of baize;  $\frac{1}{2} = \frac{3}{6}$  as much baize as broadcloth;  $\frac{3}{6}$  of  $117\frac{1}{2} = 35.25$  yards of baize;  $77.55 \div 35.25 = \$2.20$  per yard for the baize.

( 51 )

$40 \times 3\frac{1}{2} = 140 \text{ cwt.}$ ;  $10 \times 12 = 120 \text{ cwt.}$ ; The freight of 1 cwt. would be  $\frac{1}{140}$  as much as of 140 cwt., and for 1 mile  $\frac{1}{140}$  as much as for 150 miles; the freight of 120 cwt. would be 120 times as much as for 1 cwt., and for 50 miles 50 times as much as for 1 mile.

140	42 <sup>6</sup>
150	120 <sup>2</sup>
	50
	\$12. <i>Ans.</i>

( 52 )

If 70 oranges are worth 84 lemons, 50 oranges or 1 pound are worth  $\frac{50}{70}$  of 84 lemons, which are 60 lemons, worth 60 times 2 cents, or \$1.20, value of 1 pound of tea.

70	\$0	5	
	\$4	12	
	2		
	\$1.20.		Ans.

( 53 )

\$1.18 $\frac{2}{3}$ , amount of \$1 for 2yr. 8mo. at 7 per cent.; \$500 ÷ 1.18 $\frac{2}{3}$  = \$421,348 +, present value; 500 - 421,348 = \$78,652 + discount. *Ans.*

( 54 )

The interest on \$1 for 4 $\frac{1}{2}$  years would be  $\$91,125 \div 225 = \$0,405$ , and for 1 year it would be  $.405 \div 4\frac{1}{2} = \$0.09$ ; the interest on \$640 for 1 year would be  $640 \times .09 = \$57,60$ , and for 2 $\frac{1}{4}$  years it would be  $57,60 \times 2\frac{1}{4} = \$129,60$ . *Ans.*

( 55 )

$1000 \times 1.75 = \$1750$ , cash value;  $1000 \times 1.80 = \$1800$ , time value; the amount of \$1750 for 90 days, at 7 per cent., would be \$1780,625;  $1800 - 1780,625 = \$19,375$ . Most advantageous to sell on time.

( 56 )

$1575 \div 1.045 = \$1507,177 +$ , cash value of the goods.  
 $1800 - 1507,177 = \$292,823$  gain. *Ans.*

( 57 )

Let 1 represent C's, then  $\frac{5}{8}$  would equal B's, and  $\frac{3}{4}$  of  $\frac{5}{8} = \frac{5}{8}$  would equal A's;  $1 + \frac{5}{8} + \frac{5}{8} = \frac{3}{4} + \frac{20}{24} + \frac{15}{24} = \frac{59}{24}$ , therefore they are all to have 59 shares, of which A is to have 15, B 20, and C 24;  $\$482,62 \div 59 = \$8,18$ ;  $8,18 \times 15 = \$122,70$  A's;  $8,18 \times 20 = \$163,60$  B's;  $8,18 \times 24 = \$196,32$  C's.

( 58 )

$\frac{1}{4} + \frac{1}{2} = \frac{3}{4}$ , what A and B had;  $1 - \frac{3}{4} = \frac{1}{4}$  remainder, what C and D had; now if C had 5 as often as D 6, then C had  $\frac{5}{11}$  and D  $\frac{6}{11}$  of  $\frac{1}{4}$ , which gives C  $\frac{1}{4}$  and D  $\frac{3}{20}$  of the whole. Then A must have  $\frac{1}{4}$ , B  $\frac{1}{5}$ , C  $\frac{1}{4}$ , and D  $\frac{3}{20}$  of \$9268,60 = \$2317,15 A's; \$1853,72 B's; \$2317,15 C's; \$2780,58 D's.

( 59 )

5 + 5 + 7 + 8 = 25 parts all would pay; therefore, A paid  $\frac{5}{25}$  of \$475,50 = \$95,10; B  $\frac{5}{25} = $95,10$ ; C  $\frac{7}{25} = $133,14$ , and D  $\frac{8}{25} = $152,16$ .

( 60 )

$1000 \times 16 \times 35 = 560000$  ounces, whole amount of bread;

$1000 + 400 = 1400$  men;  $560000 \div 1400 = 400$  ounces for 1 man  
56 days;  $400 \div 56 = 7\frac{1}{7}$  ounces per day.

( 61 )

The first will fill  $\frac{1}{10}$  of it in 1 day; the second  $\frac{1}{15}$  in 1 day; the third will empty  $\frac{1}{20}$  of it in 1 day;  $\frac{1}{10} + \frac{1}{15} = \frac{3}{10}$  that both will fill in 1 day;  $\frac{3}{10} - \frac{1}{20} = \frac{2}{10}$ , what will remain in;  $1 \div \frac{2}{10} = 5$  days to fill it

( 62 )

$536 \div 2 = 268$  yards distance between them;  $34 \div 3 = 11\frac{1}{3}$  yards, the distance B goes in a minute;  $11\frac{1}{3} - 11 = \frac{1}{3}$  yards what B gains upon A in 1 minute. It will take him as many minutes to gain 268 yards, or to overtake A, as  $\frac{1}{3}$  is contained times in 268, which will be 804 minutes, and as he travels  $11\frac{1}{3}$  yards per minute in 804 minutes, he will travel 804 times  $11\frac{1}{3} = 9112$  yards;  $9112 \div 536 = 17$  times around the wood.

( 63 )

One man can do  $\frac{1}{10}$  of the work in 1 day, the other  $\frac{1}{15}$ , and the boy  $\frac{1}{20}$ ;  $\frac{1}{10} + \frac{1}{15} + \frac{1}{20} = \frac{7}{10}$ , and it will take them as many days to do the whole as  $\frac{7}{10}$  is contained times in 1;  $1 \div \frac{7}{10} = 1\frac{4}{7}$  days.

( 64 )

\$150 for 3 months is the same as \$1 for 450 months; \$175 for 6 months, the same as \$1 for 1050 months; \$175 for 8 months; the same as \$1 for 1400 :  $450 + 1050 + 1400 = 2900$  months; \$500 would require  $\frac{1}{500}$  as much time as \$1;  $29000 \div 500 = 58$  mo. 24 da. *Ans.*

( 65 )

$$\left. \begin{array}{l} 42 \\ 270 \\ 8\frac{1}{2} \end{array} \right\} : \left. \begin{array}{l} 63 \\ x \\ 11\frac{1}{3} \end{array} \right\} :: \left. \begin{array}{l} 98\frac{3}{4} \\ 7\frac{1}{2} \\ 2\frac{1}{2} \end{array} \right\} : \left. \begin{array}{l} 45\frac{1}{2} \\ 6\frac{1}{12} \\ 3\frac{1}{8} \end{array} \right\}$$

\$98	4
15	2
5	2
5	2
63	12
34	3
270	270
2	17
2	68
12	136
5	79
5	25
x	

( 66 )

$\frac{1}{2}$  cask =  $\frac{1}{2}$  cask + 21 gallons :  
 hence, the difference between  $\frac{1}{2}$  and  $\frac{1}{2}$   
 =  $\frac{1}{2}$  of the cask = 21 gallons : hence,  
 the cask contains 6 times 21 gallons,  
 or 126 gallons. *Ans.*

68 days. *A.*

( 67 )

In this example, the simple question is, did the investment in stocks produce a larger or smaller rate of interest than 7 per cent : and what was the difference in the amounts ?

*Stock,**Dr.*

Sept. 1, 1854, 10 shares, at \$115 per share,	\$1150
Interest on \$1150 to Jan. 1, 1856, 16 mo.	107,333
Nov. 1, 1854, 8 shares, at \$98 per share,	784,000
Interest on \$784 to Jan. 1, 1856, 14 mo.	64,026
April 1, 1855, 5 shares, at \$98 per share,	490,000
Interest on \$490 to Jan 1, 1856, 9 mo.	25,725
Cost of stock with interest, Jan 1, 1856,	<u>\$2621,084</u>

<i>Stock,</i>	<i>Cr.</i>
Feb 1, 1855, dividend on 18 shares,	\$72.00
Interest on \$72 to Jan. 1, 1856, 11 mo.	4.62
Aug. 1, 1855, dividend on 23 shares,	92.00
Interest on \$92 to Jan. 1, 1856, 5 mo.	2.684
Proceeds of 23 shares of stock, at \$99,	<u>\$2277.000</u>
Proceeds of stock,	<u>\$2448.304</u>

$\$2621.084 - \$2448.304 = \$172.780$ , loss by investment in stocks.

( 68 )

He receives 91 cents on a dollar, after deducting for taxes and repairs; therefore, \$3014.30 must be 91 per cent. of what he first receives;  $3014.30 \div .91 = \$3312.417+$ . *Ans.*

( 69 )

$\$16.50 \div 165 = .10$  cents, the cost per pound;  $36 \times .10 = \$3.60$ , the cost of 36 pounds;  $390 \times .10 = \$39$ , what he must sell 390 pounds for to get the cost;  $\$390 + 3.60 = \$42.60$ , what he must sell it for to gain the price of 36 pounds.

( 70 )

$\$406 \div 10 = 40.6$  cubic yards = the volume; the volume of a body, divided by the product of any two of its dimensions, will give the third;  $(40.6 \div 14.5) \div .7 = 4yd.$  the height.

( 71 )

$7 - 5 = 2$  miles, what he gains in 1 hour; it will take him as many hours to gain 40 miles as 2 is contained times in  $40 = 20$  hours;  $20 \times 7 = 140$  miles that he must travel.

( 72 )

The first family was equivalent to  $4\frac{1}{2}$  grown persons, and the second to 9;  $4\frac{1}{2}$  persons in 2 weeks would consume as much as 1 person in 9 weeks, and 9 persons in 3 weeks as much as 1 person in 27 weeks; both families would consume the same as 1 person in 36 weeks; therefore, the first must pay  $\frac{9}{36} = \frac{1}{4}$  of  $\$8 = \$2$ ; and the second  $\frac{27}{36} = \frac{3}{4}$  of  $\$8 = \$6$ .

( 73 )

33A. 2R. 16P. = 33.6A.;  $33.6 \times 125 = \$4200$ , value of the land;  $4200 \div 42 = 100$  thousand feet of lumber.

( 74 )

$2\frac{1}{2}$  acres reduced to feet equals 108900 square feet;  $100 \times 50 = 5000$  square feet;  $108900 \div 5000 = 21\frac{2}{5}$  lots.

( 75 )

$\$150 \div .0375 = \$4000$ , the amount insured, including premium of  $\$150$ , and  $\$25$  besides;  $150 + 25 = \$175$ ;  $4000 - 175 = \$3825$ , value of the goods.

( 76 )

$5000 \times .96 = \$4800$ , cash value of the rye; the amount of  $\$4800$  for 2 months, at 7 per cent., would be  $\$4856$ ;  $5000 - 4856 = \$144$  more advantageous to borrow the money and pay cash.

( 77 )

$\frac{1}{3}$  of  $\frac{2}{3} = \frac{1}{9}$ ;  $\frac{2}{3} - \frac{1}{9} = \frac{5}{9}$  of the capital;  $\$25000 - 5000 = 20000$ , the par value of  $\frac{5}{9}$  the whole capital;  $(20000 \div 5) \times 9 = \$36000$ , the whole capital.

( 78 )

3ft. 5in. = 41in.; 2ft. 6in. = 30in.; 6ft. = 72in.;  $41 \times 30 \times 72 = 88560$  cubic inches = the volume of the bin;  $88560$ , divided by  $2150.4$ , the number of cubic inches in a bushel, gives  $41.183 +$  bushels.

( 79 )

The perpendicular line would divide the given triangle into two right-angled triangles, with the perpendicular 45*ft.* common, and the hypotenuse of one 75*ft.*, and the hypotenuse of the other 90*ft.*; to find the base of each, the sum of which will be the required side of the given triangle;  $(75)^2 - (45)^2 = 3600$ ;  $\sqrt{3600} = 60$ *ft.*;  $(90)^2 - (45)^2 = 6075$ ;  $\sqrt{6075} = 77.942$ *ft.*;  $77.942 + 60 = 137.942 +$ *ft.* *Ans.*

( 80 )

It will take the first 72 days to travel 2160 miles; the second 80 days, and the third 90 days; therefore, the third must start first; the second 10 days after him, and the first 8 days after the second, or 18 days after the third.

( 81 )

The house did not give a profit of \$420 by \$130;  $420 - 130 = \$290$ , actual profit;  $7180 - 290 = \$6890$ , the purchase price.

( 82 )

The two companies consisted of 47 men; hence, the first cleared  $\frac{2}{7}$ , and the second  $\frac{3}{7}$  of 188 acres, or the first cleared 100 acres, and the second 88 acres; as the first company contained 3 more men than the second, \$84 must be  $\frac{3}{7}$  of the whole cost of clearing;  $(84 \div 3) \times 47 = \$1316$ , whole cost;  $1316 \div 188 = \$7$  per acre, cost of clearing.

( 83 )

Find the equated time from the time the first note falls due.

*days.*

Due Feb. 12th, 1856,	$100 \times 0 = 00000$
" March 12th, "	$400 \times 28 = 11200$
" April 1st, "	$300 \times 48 = 14400$
	<hr/>
	800      25600 (32 days.)

The average time would be 32 days from Feb. 12, 1856, or on the 16th day of March.

( 84 )

$32 \times 25 \times 144 = 115200 \text{ sq. in.}$ , area of the floor;  $15 \times 15 = 225 \text{ sq. in.}$ , area of a slab;  $115200 \div 225 = 512$  slabs;  $(32 \times 25) \div 9 = 88\frac{2}{3} \text{ sq. yd.}$ , area of floor;  $88\frac{2}{3} \times 3.40 = \$302,22\frac{2}{3}$ , whole cost.

( 85 )

$500 + 425 + 300 + 250 + 175 = \$1650$ , amount of bequests.

1650 : 500 :: 1155 :  $x = \$350$  A's.

1650 : 425 :: 1155 :  $x = \$297,50$  B's.

1650 : 300 :: 1155 :  $x = \$210$  C's.

1650 : 250 :: 1155 :  $x = \$175$  D's.

1650 : 175 :: 1155 :  $x = \$122,50$  E's.

( 86 )

If 27lb. of soap is worth 18lb. of sugar,	18	27	9
1lb. of sugar is worth $\frac{1}{18}$ of 27 = $\frac{27}{18}$ lb. of	18	27	8
soap; 48lb. of sugar will be worth 48	\$	7	
times as much; $\frac{27}{18} \times 48 = 72$ lb. of soap,		72	
or 14lb. of coffee; 1lb. of coffee will be			
worth $\frac{1}{14}$ of 72 lb. of soap = $\frac{36}{7}$ lb. of soap, and 7lb. of coffee will			
be worth 7 times $\frac{36}{7} = 36$ lb. of soap, or 3lb. of tea; 1lb. of tea			
will be worth $\frac{1}{3}$ of 36 lb. of soap = 12 lb., and 6lb. of tea will be			
worth 6 times 12 = 72 lb. of soap.			

Ans.

( 87 )

Let 1 or  $\frac{1}{2}$  represent the time to midnight, then  $\frac{1}{2}$  will represent the time past noon, and  $\frac{1}{2} + \frac{1}{2} = \frac{1}{1}$  the whole time from noon to midnight; if 12 hours be  $\frac{1}{2}$ ,  $\frac{1}{2}$  of 12 hours would be  $\frac{1}{2} = \frac{1}{2}$  of  $12 = 1\frac{1}{2}$  hours,  $\frac{1}{2}$  of the time past noon would be 4 times  $1\frac{1}{2} \text{ hr.} = 5\frac{1}{2} \text{ hr.} = 5$  o'clock and 20 minutes, P. M.

( 88 )

1 yard in length will cost $\frac{1}{2}$ as much as	\$	2
$\frac{2}{3} \text{ yd.}$ , and 1 yard in width $\frac{5}{7}$ as much as	3	4
$\frac{1}{8} \text{ yd.}$ wide; $\frac{5}{8}$ of a yard will cost $\frac{5}{8}$ as	7	8
much as 1 yard in length, and $1\frac{1}{2} \text{ yd.}$ wide	8	5
$\frac{1}{4}$ as much as 1 yard wide.	4	7
	3	2 = \$3\frac{1}{2}

Ans.



( 89 )

If he had bought all turkeys they would have cost him \$66 ; but as he paid only \$51,60, he saved \$14,40 by buying a part chickens ; and as he would save the difference between \$1,10 and 50 cents in buying 1 chicken, so he must buy as many chickens as 60 cents is contained times in \$14,40 = 24 chickens ;  $60 - 24 = 36$  turkeys.

( 90 )

$6 + 4 + 3 = 13$  shillings, what he paid to them for 1 day's work ; for 104 shillings he could employ them as many days as 13 is contained times in  $104 = 8$  days. *Ans.*

( 91 )

$5 + 6 + 7 = 18$  ; then the first must have  $\frac{5}{18}$ , the second  $\frac{6}{18}$ , and the third  $\frac{7}{18}$  of \$6471 : hence, \$1797,50, the first ; \$2157, the second ; and \$2516,50, the third.

( 92 )

$1600 + 300 = \$1900$ , whole stock and gain. Now, the gain of the first will bear the same relation to the whole gain as his stock and gain do to the whole stock and gain—or  $1900 : 1140 :: 300 : x = \$180$ , the gain of the first ;  $1140 - 180 = \$960$ , the stock of the first ;  $1600 - 960 = \$640$ , the stock of the second ; and  $300 - 180 = \$120$ , the gain of the second.

( 93 )

$(3 \div 4.45) \times 75.75 = 49.945 +$  feet. *Ans.*

( 94 )

A can do  $\frac{1}{3}$  of the work in 1 week ; if B can do 3 times as much in 8 weeks, he can do A's work in  $\frac{8}{3}$  of a week, and in 1 week  $\frac{3}{8}$  of it ; if C can do 5 times as much in 12 weeks, he can do A's work in  $\frac{12}{5}$  of a week, and in 1 week  $\frac{5}{12}$  of it ;  $\frac{1}{3} + \frac{3}{8} + \frac{5}{12} = \frac{7}{4} = \frac{9}{8}$  what all will do in 1 week ; since they can do  $\frac{9}{8}$  of the work in 1 week, they will do  $\frac{1}{8}$  of the work in  $\frac{1}{9}$  of 1 week, and to do the whole or  $\frac{8}{8}$  will require 8 times  $\frac{1}{9}$  of 1 week =  $\frac{8}{9}$  of a week. *Ans.*

( 95 )

$11\frac{1}{2} \times 4 = 46 \text{ mi.}$ ; the first is 46 mi. in advance when the second passes the point;  $17\frac{1}{2} - 11\frac{1}{2} = 6$  miles, the second gains upon the first in 1 hour; it will require as many hours to overtake him as 6 is contained times in  $46 = 7\frac{2}{3}$  hours;  $7\frac{2}{3} + 4 = 11\frac{2}{3}$  hours, the first will travel;  $11\frac{1}{2} \times 11\frac{2}{3} = 134\frac{1}{3}$  miles, the distance the first will travel.

( 96 )

$\$120 = \text{A's gain for 6 mo.}; 120 \div 6 = \$20$ , A's gain for 1 mo.

$\$400 = \text{B's gain for 12 mo.}; 400 \div 12 = \$33\frac{1}{3}$ , B's gain for 1 mo.

$\$100 = \text{C's gain for 15 mo.}; 100 \div 15 = \$6\frac{2}{3}$ , C's gain for 1 mo.

$\$20 + \$33\frac{1}{3} + \$6\frac{2}{3} = \$60$ , entire gain for 1 month.

Now, since we have the whole gain, and the gain of each, *for the same time*; we have

$$60 : 20 :: 1600 : x = \$533\frac{1}{3} \text{ A's.}$$

$$60 : 33\frac{1}{3} :: 1600 : x = \$888\frac{8}{9} \text{ B's.}$$

$$60 : 6\frac{2}{3} :: 1600 : x = \$177\frac{7}{9} \text{ C's.}$$

$$\text{PROOF, } 533\frac{1}{3} + 888\frac{8}{9} + 177\frac{7}{9} = \$1600.$$

( 97 )

First find the number of days that it would take each to travel around it, by dividing the circumference by the number of miles each travels per day; it would take A  $12\frac{1}{8}$ , B  $7\frac{3}{10}$ , and C  $4\frac{9}{16}$  days; find the least common multiple of these three numbers, which will be the time that they will all be together again, which is  $36\frac{1}{2}$  days. *Ans.*

( 98 )

$(2)^3 \times 1728 = 13824 \text{ c. in.}$ , volume of the cube; 13824 less 10 per cent.  $= 12441.6 \text{ c. in.}$ , to be drawn into wire;  $(\frac{1}{8})^2 \times 7854 = .012272$ , area of the base of the cylinder of wire;  $12441.06 \div .012272 = 1013820.078 +$  inches, length of wire  $= 84485.006$  feet.

( 99 )

\$10000 at 6 per cent. yields \$600. Sold out at 65 per cent., giving \$6500 : this, invested at  $82\frac{1}{2}$  per cent., gives  $6500 \div .825 = \$7878,787$ , the interest on which, at 5 per cent., is \$393,939 ; hence, the difference, \$206,061, is in favor of the 1st investment.

( 100 )

$46\frac{1}{2} \times 8 \times 2\frac{2}{3} = 967.2c. yd.$ , what would take one boat through ;  $365 - (52 + 8) = 305$  days in the year ;  $40 + 40 = 80$  boats per day ;  $967.2 \times 80 \times 305 = 23599680 c. yd.$  *Ans.*

( 101 )

$365 \times 22 \times 64 = \$513920$ , whole amount of tolls ;  $22 \times 5 \times 66 = \$7260$ , expenses ;  $513920 - 7260 = \$506660$ , whole tolls ;  $506660 - 200000 = 305660$  ;  $305660 \div 66 = \$4646,363.$  *Ans.*

( 102 )

$$\begin{array}{r} \text{mo.} \\ 60 \times 48 = 2880 \\ 800 \times 43 = 34400 \\ \hline 37280 \text{ 1st.} \end{array}$$

$$\begin{array}{r} 400 \times 48 = 19200 \\ 500 \times 42 = 21000 \\ 500 \times 36 = 18000 \\ 500 \times 30 = 15000 \\ 500 \times 24 = 12000 \\ 500 \times 18 = 9000 \\ 500 \times 12 = 6000 \\ 500 \times 6 = 3000 \\ \hline 103200 \text{ 3d.} \end{array}$$

$$\begin{array}{r} 800 \times 48 = 38400 \\ 800 \times 36 = 28800 \\ 800 \times 24 = 19200 \\ 800 \times 12 = 9600 \\ \hline 96000 \text{ 5th.} \end{array}$$

$$\begin{array}{r} 600 \times 48 = 28800 \\ 1800 \times 42 = 75600 \\ \hline 104400 \text{ 2d.} \end{array}$$

$$\begin{array}{r} 900 \times 40 = 36000 \\ 900 \times 34 = 30600 \\ 900 \times 28 = 25200 \\ 900 \times 22 = 19800 \\ 900 \times 16 = 14400 \\ 900 \times 10 = 9000 \\ 900 \times 4 = 3600 \\ \hline 138600 \text{ 4th.} \end{array}$$

$$\begin{array}{r} 37280 \\ 104400 \\ 103200 \\ 138600 \\ 96000 \\ \hline 479480 \text{ whole stock.} \end{array}$$

479480 : 37280 :: 20000 :  $x = \$1555,017 + 1\text{st.}$

479480 : 104400 :: 20000 :  $x = \$4354,717 + 2\text{d.}$

479480 : 103200 :: 20000 :  $x = \$4304,663 + 3\text{d.}$

479480 : 138600 :: 20000 :  $x = \$5781,263 + 4\text{th.}$

479480 : 96000 :: 20000 :  $x = \$4004,338 + 5\text{th.}$

( 103 )

$44 + 49 = 93$ , the number of men it would require to increase the square by 1 man on a side; deducting 1 for the man occupying the corner, and dividing by 2 we have the number of men on one side of the square;  $(93 - 1) \div 2 = 46$ ;  $(46)^2 = 2116$  = the number of men in the square first formed;  $2116 + 44 = 2160$  men in the army.

( 104 )

$\frac{1}{3}, \frac{1}{4}, \frac{1}{5} = \frac{20}{60}, \frac{15}{60}, \frac{12}{60}$ ; then \$100 must be divided into 47 shares, of which A has 20, B 15, and C 12, or  $\frac{20}{47}, \frac{15}{47}$ , and  $\frac{12}{47}$  of \$100; but by C's death, A and B's shares are increased in the ratio of 20 to 15, so that A's share will be increased by  $\frac{20}{15}$  of  $\frac{12}{47}$ , which added to  $\frac{20}{47} = \frac{188}{235}$ ; and B's will be increased by  $\frac{15}{20}$  of  $\frac{12}{47}$ , which added to  $\frac{15}{47} = \frac{141}{235}$ , giving A \$57,142, and B \$42,857.

( 105 )

When she left the last place she had \$3, which was  $\frac{1}{2}$  a dollar less than  $\frac{1}{2}$  she had when she came to the last place; then,  $3\frac{1}{2}$  is one-half of 2 times  $3\frac{1}{2} = \$7$ , what she had when she left the second place, which was  $\frac{1}{2}$  a dollar less than  $\frac{1}{2}$  she had when she came to the second place; then  $7\frac{1}{2}$  is one-half of 2 times  $7\frac{1}{2} = \$15$ , what she had when she left the first place, which was  $\frac{1}{2}$  a dollar less than  $\frac{1}{2}$  she had when she came to the first place; then  $15\frac{1}{2}$  is one-half of 2 times  $15\frac{1}{2} = \$31$ , what she started with.

( 106 )

Let 1 denote the quantity of fluid discharged by the first pipe in 4 hours, then  $\frac{1}{4}$  will be the quantity discharged in 1 hour; but the quantities discharged are as the areas of their sections, and therefore as the squares of their diameters; hence,

$6^2 : 3^2 :: \frac{1}{4} : x = \frac{1}{16}$ , what 1 of the smaller pipes will discharge in 1 hour; 4 pipes will discharge 4 times as much  $= \frac{1}{4}$ ; therefore the 4 smaller pipes will discharge as much in 1 hour as the larger; and to discharge 2 times as much in 4 hours, would require  $4 \times 2 = 8$  hours. *Ans.*

( 107 )

$(370 - 40) \div (12 - 1) = \$30$ , common difference.

$(370 + 40) \times 6 = \$2460$ , whole cost.

( 108 )

$297,60 + 321,92 + 375,83 + 402,50 = \$1397,85$ , but as the amount each paid is named 3 times,  $1397,85 \div 3 = \$465,95$ , the actual sum paid by the 4 persons; subtracting what any three paid from the whole amount, and the remainder will be what the fourth paid.

$465,95 - 321,92 = \$144,03$ , A's.

$465,95 - 375,83 = \$ 90,12$ , B's.

$465,95 - 402,50 = \$ 63,45$ , C's.

$465,95 - 297,60 = \$168,35$  D's.

( 109 )

$\pounds 3000$  at  $7\frac{1}{4}$  per cent.  $= \$14333,333$

$\pounds 3000$  at par  $= 13333,333$

The premium = diff.  $\frac{\$1000}{\quad}$

What amount of 4 months' receivables (including grace) must be sold when the rate of discount is 12 per cent. to pay for \$14333,33 worth of Exchange?

The interest of \$1.00 for 4mo. 3da. at 12 per cent. = .041 ; and  $1.00 - .041 = .959$ . Then,  $.959 : 1.00 :: 14333,33 : 14946,02$  = amount of receivables used in the transaction.

2d. What is the amount and rate of premium when the notes for it, are at 6 months, and 10 per cent. discount ?

First,  $.0508\frac{1}{3} =$  interest on \$1.00 for 6mo. 3da. at 10 per cent., and  $\$1.00 - .0508\frac{1}{3} = .9491\frac{2}{3}$  ; hence, we have  $1.00 : .9491\frac{2}{3} :: 14946,02 : \$14186,264 =$  what must be paid for £3000 at the required premium ; and  $14186,264 - 13333,333 = \$852,931 =$  the required premium. Now, as \$1000 constituted the premium when the rate was  $7\frac{1}{2}$  per cent., it is evident that when the premium is less, the rate of that premium will also be less. Therefore,  $1000 : 852,931 :: .075 : .06397 =$  the required rate.

( 110 )

$15000 \div 3 = \$5000$ , equal payment.

$5000 \div 1,02\frac{1}{3} = \$4885,9934 +$  present value.

$5000 \div 1,035 = \$4830,9178 +$  " "

$5000 \div 1,0525 = \$4750,5938 +$  " "

\$14467,505 present value of purchase.

( 111 )

60 } 84	$2\frac{1}{4} : 3 :: 45 : x.$	$12\ 60$	$45\ 9$
$2\frac{1}{4} \}$	$2\frac{1}{4}$	$0\ 4$	$84$
$1\frac{3}{4} \}$		$5$	$3$
		$7$	$9$
		<u>5</u>	<u>2</u>
			$4$
			<u>486</u>
			$97\frac{1}{2} lb.$

Ans.

( 112 )

The eggs cost  $\frac{3}{4}$  of a cent each, and were sold for  $\frac{4}{5}$  of a cent each ;  $\frac{4}{5} - \frac{3}{4} = \frac{1}{20}$ , the gain on 1 egg ;  $4 \div \frac{1}{20} = 80$  eggs, the number sold.

( 113 )

$\frac{1}{8} + \frac{1}{12} + \frac{1}{7} + \frac{1}{2} + 5 + 4$  must equal the whole length of life ;

$\frac{1}{8} + \frac{1}{12} + \frac{1}{7} + \frac{1}{2} = \frac{75}{84}$ , then 9 years must make up the whole

$1 - \frac{75}{84} = \frac{9}{84}$ , or the 9 years of his life, from which we readily find his age to be 84 years.

( 114 )

Find the volume of two cylinders, each 40 feet in length, and one 6ft. 6in. in diameter, and the other 3ft. 6in., and the difference in volume will be the contents of the wall.

$$\begin{aligned} 42^2 \times .7854 &= 1385.4456 \text{ sq. in. of surface ; } 1385.4456 \times 40 \\ &= 665013.888 \text{ cu. in. ; } 665013.888 \div 1728 = 384.846 \text{ cu. ft.} \\ 1327.326 - 384.846 &= 942.48 \text{ cu. ft., contents of the wall.} \end{aligned}$$

( 115 )

100 links = 1 chain ; 16 links =  $\frac{16}{100}$  chain.

$$\begin{aligned} 42.16 \times 37 &= 1559.92 \text{ sq. ch.} = 155.992 \text{ acres} \\ &= 155 \text{ A. } 3 \text{ R. } 38.72 \text{ P. Ans.} \end{aligned}$$

• ( 116 )

A, B and C did  $\frac{4}{10}$  of the work in 4 days, B and C  $\frac{3}{10}$  in 5 days, and C  $\frac{3}{10}$  in  $11\frac{1}{2}$  days. In 1 day C will do  $\frac{2}{75}$  of the work, and it will take him as many days to do the whole work as  $\frac{75}{2}$  is contained times in 1, which is  $37\frac{1}{2}$  days.

B and C can do  $\frac{3}{50}$  of the work in 1 day,  $\frac{3}{50} - \frac{2}{75} = \frac{1}{50}$  what B can do alone in 1 day, and it will take him as many days to do the whole work as  $\frac{50}{1}$  is contained times in 1, which is 50 days.

A, B and C can do  $\frac{1}{10}$  of the work in 1 day ;  $\frac{1}{10} - \frac{3}{50} = \frac{2}{50}$  what A can do in 1 day, and it will take him as many days to do the whole work as  $\frac{50}{2}$  is contained times in 1, which is 25 days. Then it will take A 25 days, B 50 days, and C  $37\frac{1}{2}$  days.

( 117 )

Each annual payment is made up of two parts—interest and principal. The payment, at the end of the first year, consists of the interest on \$1500, and a certain portion of the principal, which we will call an instalment. The second annual payment consists of the interest on the diminished principal, and a second instalment. Now, the interest on \$1500, for 1 year, plus the first instalment, is equal to the second year's interest, plus the second instalment, since each is equal to an annual payment. But the second year's interest is less than the first, by the interest on the first instalment; therefore, the second instalment exceeds the first by this interest; or by the .07 part: hence, the second instalment is equal to 1.07 times the first. In the same way, it may be shown, that the third is equal to the second taken 1.07 times; or equal to the first, taken  $1.07 \times 1.07$  times: and the same for the other instalments. Hence, the instalments form a geometrical progression, of which the first term is the first instalment, the ratio 1.07, the number of terms 5, and the sum of the series 1500: the 1st term is required.

$$\text{1st term} = \frac{150 \times .07}{1.07^5 - 1} = 260.837 = \text{1st instalment,}$$

$$\$1500 \times .07 = \$105, \text{ 1st annual interest,}$$

$$\$105 + 260.837 = \$365.837, \text{ annual payment.}$$

( 118 )

A, B, C will fill  $\frac{1}{8}$  in 1 hour; B, C, D,  $\frac{1}{8}$ ; C, D, A,  $\frac{1}{10}$ ; and D, A, B,  $\frac{1}{12}$ ;  $\frac{1}{8} + \frac{1}{8} + \frac{1}{10} + \frac{1}{12} = \frac{57}{120}$ , and because the amount poured in by each pipe has been named 3 times, we divide  $\frac{57}{120}$  by 3 =  $\frac{19}{40}$ , what the 4 pipes will fill in 1 hour; E, F, G will empty  $\frac{1}{8}$  in 1 hour, F, G, H,  $\frac{1}{8}$ ; G, H, E,  $\frac{1}{4}$ ; and H, E, F,  $\frac{1}{3}$ ;  $\frac{1}{8} + \frac{1}{8} + \frac{1}{4} + \frac{1}{3} = \frac{57}{60}$ , and because the amount each pipe empties is named 3 times, we divide  $\frac{57}{60}$  by 3 =  $\frac{19}{60}$ , what the 4 pipes will empty in 1 hour;  $\frac{19}{40} - \frac{19}{60} = \frac{19}{120}$  of the whole fountain will be emptied in 1 hour; it will take as many hours to empty the fountain as  $\frac{19}{120}$  is contained times in 1, which is  $6\frac{6}{19}$  hours.



( 119 )

$$60\frac{1}{2} \times 33\frac{1}{2} \times 144 = 291852 \text{ sq. in., area of the floor}$$

$$15 \times 12 \times 15 = 2700 \text{ sq. in., area of 1 plank.}$$

$$291852 \div 2700 = 108\frac{7}{5} \text{ planks. Ans.}$$

( 120 )

Since the weights of similar bodies are in the same ratio as their volumes, and therefore as the cubes of their diameters, hence,

$$5 : 78.125 :: 2^3 : x^3 = 125 ; \sqrt[3]{125} = 5 \text{ inches.}$$

( 121 )

The divisors, which give "the present value," are what one dollar, placed at compound interest, (the interest being added semi-annually), would produce from April 1st, 1853, to the times of the several payments.

Payment April 1st, 1852, without interest,	\$500,00
" " 1st, 1853, with 1 year's interest,	535,00
Present value of payment for 1854	= 466,75 +
" " " 1855	= 435,72 +
" " " 1856	= 406,75 +
" " " 1857	= 379,71 +
" " " 1858	= 354,47 +
" " " 1859	= 330,90 +
" " " 1860	= 308,89 +
" " " 1861	= 288,35 +
Present value of the whole on the } 1st of April, 1853, }	\$4006,54 +

## MENSURATION.

( 2 )

$$(60 \times 12) \div 2 = 360 \text{ sq. ch.}; 360 \div 10 = 36 \text{ acres.}$$

( 3 )

$$(45 \times 38) \div 2 = 855 \text{ sq. rd.} = 5 \text{ A. } 1 \text{ R. } 15 \text{ P. Ans.}$$

( 4 )

$$(75 \times 36) \div 2 = 1350 \text{ sq. ch.} = 135 \text{ acres.}$$

( 1 )

$$(66.16 \times 66.16) \div 10 = 437.71456 \text{ acres} = 437 A. 2 R. 34 P +.$$

( 2 )

$$(54 \times 54) \div 10 = 291.6 \text{ acres} = 291 A. 2 R. 16 P. \text{ Ans.}$$

( 3 )

$$75 \times 75 = 5625 \text{ sq. rd.} = 35 A. 0 R. 25 P. \text{ Ans.}$$

( 4 )

$$80 \times 40 = 3200 \text{ sq. rd.} = 20 A. \text{ Ans.}$$

( 5 )

$$80 \times 80 = 6400 \text{ sq. rd.} = 40 A. \text{ Ans.}$$

( 6 )

$$(30 \times 5) \div 10 = 15 A. \text{ Ans.}$$

( 7 )

$$54 \text{ ch.} \times 4 = 216 \text{ rd.}; 216 \times 18 = 3888 \text{ sq. rd.} = 24 A. 1 R. 8 P.$$

( 8 )

$$720 \text{ ft.} = 240 \text{ yd.}; 542 \times 240 = 130080 \text{ sq. yd.} = 26 A. 3 R. 20 P. \\ 5 \text{ sq. yd.} \text{ Ans.}$$

( 2 )

$$(24.82 + 16.44) \times 10.30 \div 2 = 21.2489 \text{ acres} \\ = 21 A. 0 R. 39.824 P. \text{ Ans.}$$

( 3 )

$$(51 + 37\frac{1}{2}) \times 20\frac{1}{2} \div 2 = 921,875 \text{ sq. ft.} \text{ Ans.}$$

( 4 )

$$(24.5 + 41) \times 21.5 \div 2 = 704.125 \text{ sq. yd.} \text{ Ans.}$$

(5)

$$(24.5 + 15) \times 30.80 \div 2 = 608.3 \text{ sq. ch.} = 60 \text{ A. } 3 \text{ R. } 12.8 \text{ P. } \text{Ans.}$$

(6)

$$(40 + 64) \times 52 \div 2 = 2704 \text{ sq. ch.} = 270 \text{ A. } 1 \text{ R. } 24 \text{ P. } \text{Ans.}$$

(2)

$$186 \times 3.1416 = 584.3376. \text{ Ans.}$$

(3)

$$40 \times 3.1416 = 125.664. \text{ Ans.}$$

(4)

$$57 \times 3.1416 = 179.0712. \text{ Ans.}$$

(2)

$$23304.3888 \div 3.1416 = 7418. \text{ Ans.}$$

(3)

$$13700 \div 3.1416 = 4360.835 +. \text{ Ans.}$$

(2)

$$(5)^2 \times .7854 = 19.635. \text{ Ans.}$$

(3)

$$(14)^2 \times .7854 = 153.9384. \text{ Ans.}$$

(4)

$$(35)^2 \times .7854 \div 9 = 1.069016 + \text{ sq. yd. } \text{Ans.}$$

(2)

$$(14)^2 \times 3.1416 = 615.7536. \text{ Ans.}$$

(3)

$$(36)^2 \times 3.1416 = 4071.5136. \text{ Ans.}$$

(4)

$$(7918.7)^2 \times 3.1416 = 196996571.722104 \text{ sq. mi. } \textit{Ans.}$$

(2)

$$(8^2 \times 3.1416 \times 8) \div 6 = 268.0832 \text{ volume. } \textit{Ans.}$$

(3)

$$((16)^2 \times 3.1416 \times 16) \div 6 = 2144.6656 \text{ volume. } \textit{Ans.}$$

(4)

$$((7918.7)^2 \times 3.1416 \times 7918.7) \div 6 = 2599927920626.63749 +$$

(5)

$$(12^2 \times 3.1416 \times 12) \div 6 = 904.7808. \textit{ Ans.}$$

(1)

$$35 \times 5 \times 52 = 9100 \text{ sq. ft. } \textit{Ans.}$$

(2)

$$15 \times 8 \times 12 = 1440 \text{ sq. ft.}$$

(2)

$$48 \times 48 \times 48 = 110592 \text{ c. in. } \textit{Ans.}$$

(3)

$$3 \text{ ft. } 2 \text{ in.} \times 2 \text{ ft. } 8 \text{ in.} \times 5 \text{ ft.} = 42\frac{1}{2} \text{ c. ft. } \textit{Ans.}$$

(4)

$$1728 \times 42\frac{1}{2} = 72960 \text{ c. in., volume of the cistern.}$$

$$72960 \div 231 = 315\frac{5}{7} \text{ gallons. } \textit{Ans.}$$

(5)

$$691 \times 20 = 13820 \text{ c. ft. } \textit{Ans.}$$

( 2 )

$$8\frac{1}{2} \times 3.1416 \times 28 = 233.33\frac{1}{2} \text{ sq. ft. } \textit{Ans.}$$

( 3 )

$$5 \times 3.1416 \times 60 = 2827.44 \text{ sq. in. } \textit{Ans.}$$

( 4 )

$$40 \times 3.1416 \times 50 = 6283.2 \text{ sq. ft. } \textit{Ans.}$$

( 2 )

$$(40)^2 \times .7854 \times 29 = 36442.56. \textit{ Ans.}$$

( 3 )

$$(24)^2 \times .7854 \times 30 = 13571.712. \textit{ Ans.}$$

( 4 )

$$(32)^2 \times .7854 \times 12 = 9650.9952. \textit{ Ans.}$$

( 5 )

$$(25)^2 \times .7854 \times 15 = 7363.125. \textit{ Ans.}$$

( 2 )

$$(365 \times 36) \div 3 = 4380. \textit{ Ans.}$$

( 3 )

$$(207 \times 36) \div 3 = 2484. \textit{ Ans.}$$

( 4 )

$$(562 \times 30) \div 3 = 5620. \textit{ Ans.}$$

( 5 )

$$(540 \times 32) \div 3 = 5760. \textit{ Ans.}$$

( 6 )

$$(50 \times 24 \times 36) \div 3 = 14400. \textit{ Ans.}$$

( 7 )

$$(15 \times 15 \times 24) \div 3 = 1800. \text{ Ans.}$$

( 2 )

$$((36)^2 \times .7854 \times 27) \div 3 = 9160.9056. \text{ Ans.}$$

( 3 )

$$((35)^2 \times .7854 \times 27) \div 3 = 8659.035. \text{ Ans.}$$

( 4 )

$$((20)^2 \times .7854 \times 27) \div 3 = 2827.44 \text{ Ans.}$$

## GAUGING.

( 2 )

$$26 \div 38 = .68\frac{8}{19}; 8551 \times 38 = 32.4938 \text{ in. mean diameter.}$$

( 3 )

$$22 \div 34 = 64\frac{1}{7}; 8211 \times 34 = 28.2574 \text{ in. mean diameter.}$$

( 1 )

$$30 \div 36 = 83\frac{1}{3}; .9467 \times 36 = 34.0812; (34.0812)^2 \times 50 \times 34 \\ = 197.459 + \text{ gallons of wine.}$$

( 2 )

$$(34.0812)^2 \times 50 \times 28 = 162.613 + \text{ gallons of beer.}$$

( 3 )

$$30 \div 35 = 85.7; .9556 \times 36 = 33.446 \text{ mean diameter.}$$

$$(33.446)^2 \times 36 \times 34 = 136.9209 + \text{ gallons of wine.}$$

$$(33.446)^2 \times 36 \times 28 = 112.7583 + \text{ gallons of beer.}$$

( 4 )

$$24 \div 36 = 66\frac{2}{3}; .8954 \times 36 = 32.234 \text{ mean diameter.}$$

$$(32.234)^2 \times 42 \times 34 = 148.3772 + \text{ gallons of wine.}$$

## MECHANICAL POWERS.

(1)

$$1 : 1 :: 40 : x = 40 \text{ pounds. } \textit{Ans.}$$

(2)

The distance from the power to the fulcrum is 2 times that of the weight.

$$2 : 1 :: 50 : x = 25 \text{ pounds. } \textit{Ans.}$$

(3)

$$1 : 2 :: 25 : x = 50 \text{ pounds. } \textit{Ans.}$$

(4)

$$6 : 2 :: 60 : x = 20 \text{ pounds. } \textit{Ans.}$$

(5)

$$5 : 1 :: 200 : x = 40 \text{ pounds. } \textit{Ans.}$$

(6)

$$1 : 1 :: 1 : x = 1 \text{ in.}; 1 \times 1\frac{1}{2} = 1\frac{1}{2} \text{ in.}; 1 \times 2 = 2 \text{ in.}; 1 \times 4 = 4 \text{ in.}$$

(7)

$$5 : 8 :: 40 : x = 64 \text{ pounds. } \textit{Ans.}$$

(8)

$$8 : 12 :: 100 : x = 150 \text{ pounds. } \textit{Ans.}$$

(1)

$$60 \div 1 = 60 \text{ pounds. } \textit{Ans.}$$

(2)

$$80 \div 2 = 40 \text{ pounds. } \textit{Ans.}$$

(3)

$$100 \div 4 = 25 \text{ pounds.}$$

(1)

$$40 : 600 :: 6 : x = 90 \text{ in.} = 7\frac{1}{2} \text{ ft.} \quad \text{Ans.}$$

(2)

$$400 : 100 :: 6 : x = 1\frac{1}{2} \text{ ft.} \quad \text{Ans.}$$

(1)

$$30 : 6 :: 200 : x = 40 \text{ pounds.} \quad \text{Ans.}$$

(2)

$$10 : 20 :: 50 : x = 100 \text{ pounds.} \quad \text{Ans.}$$

(3)

$$45 : 15 :: 180 : x = 60 \text{ pounds.} \quad \text{Ans.}$$

(1)

$$2 : 12 :: 96 : x = 576 \text{ pounds.} \quad \text{Ans.}$$

(2)

$$3 : 27 :: 250 : x = 2250 \text{ pounds.} \quad \text{Ans.}$$

(1)

$$\frac{1}{2} : 180 :: 720 : x = 259200 \text{ pounds.} \quad \text{Ans.}$$

(2)

$$24 \times 3.1416 \times 12 = 904.7808 \text{ in. circumference.}$$

$$904.7808 : \frac{1}{2} :: 4000 : x = 1.47 + \text{lb.} \quad \text{Ans.}$$

(3)

First get the power that will produce 10000 lb. effort by the wedge;  $30 : 2\frac{1}{2} :: 10000 : x = 833\frac{1}{3} \text{ lb.}$  = to the weight sustained by the screw;  $3.1416 \times 20 \times 12 = 753.9840 \text{ in. circumference}$ ;  $753.9840 : 1 :: 833\frac{1}{3} : x = 1.1 + \text{lb.}$

(4)

$$30 \times 3.1416 \times 12 = 1130.976 \text{ circumference.}$$

$$282744 : 300 :: 1130.976 : x = 1.20 \text{ inches.}$$



## UNIFORM MOTION.

( 1 )

$$23 \times 5400_{\text{sec.}} = 124200_{\text{ft.}} = 23_{\text{mi.}} \ 2760_{\text{ft.}} \quad \text{Ans.}$$

( 2 )

$$32 \times 180_{\text{sec.}} = 5760 \text{ feet.} \quad \text{Ans.}$$

( 3 )

$$5280^* \times 12 \div 6 = 10560_{\text{sec.}} = 2_{\text{hr.}} \ 56_{\text{m.}} \quad \text{Ans.}$$

( 4 )

$$15 \times 5280 \div 2\frac{3}{4} \times 60 \times 60 = 8 \text{ feet.} \quad \text{Ans.}$$

( 5 )

$$35 \div 1\frac{1}{2} = 23\frac{1}{2} \text{ seconds.} \quad \text{Ans.}$$

( 6 )

$$1000 \div 3\frac{3}{4} \times 60 = 4\frac{4}{9} \text{ feet.} \quad \text{Ans.}$$

( 7 )

The vessel has a start of  $170 \times 4 = 680$  miles. It will take the clipper  $680 \div (275 - 170) = 6_{\text{da.}} \ 11\frac{3}{7}_{\text{hr.}}$  to gain this distance by her superior sailing.

( 8 )

$$100 \times 5280 \div 11 \times 60 \times 60 = 13\frac{1}{3} \text{ feet.} \quad \text{Ans.}$$

( 9 )

$$1127 \times 31.3 = 35275.1_{\text{ft.}} = 6_{\text{mi.}} \ 3595.1_{\text{ft.}} \quad \text{Ans.}$$

( 10 )

$$69\frac{1}{8} \times 3 \times 5280 \div 95 = 11532\frac{1}{8}_{\text{sec.}} = 3_{\text{hr.}} \ 12_{\text{m.}} \ 12\frac{1}{8}_{\text{sec.}} \quad \text{Ans.}$$

---

\* Number of feet in 1 mile. See Table.

( 11 )

$$95000000 \div 191300 = 496.6 \text{ sec.} = 8 \text{ m. } 16.6 \text{ sec. } \text{Ans.}$$

( 12 )

$$2300 \div .14 = 164.285 \text{ miles} = \text{velocity of current.}$$

LAWS OF FALLING BODIES.

( 1 )

$$16\frac{1}{2} + 11 \times 32\frac{1}{8} = 369\frac{1}{2} \text{ feet.}$$

$$16\frac{1}{2} \times 144 = 2316 \text{ feet.}$$

( 2 )

$$16\frac{1}{2} \times 15 \times 15 = 3618\frac{3}{4} \text{ feet.}$$

$$32\frac{1}{8} \times 15 = 482\frac{1}{2} \text{ feet.}$$

( 3 )

The velocity =  $\sqrt{2 \times 32\frac{1}{8} \times \text{height of fall}}$ . Therefore, the  
120 squared =  $2 \times 32\frac{1}{8} \times \text{height of fall}$ . Hence, height of fall  
=  $120 \times 120 \div 2 \times 32\frac{1}{8} = 223\frac{1}{2} \text{ feet. } \text{Ans.}$

( 4 )

$100 = 16\frac{1}{2} \times \text{square of number of seconds}$ . Therefore, num-  
ber of seconds =  $\sqrt{100 \div 16\frac{1}{2}} = 2\frac{1}{2} \text{ seconds, nearly.}$

( 5 )

$$16\frac{1}{2} \times 100 = 1608\frac{1}{2} \text{ feet, the space.}$$

$$32\frac{1}{8} \times 10 = 321\frac{1}{4} = \text{the velocity.}$$

( 6 )

$1000 \times 1000 = 2 \times 32\frac{1}{8} \times \text{height}$ . Therefore, the height =  
 $1000000 \div 64\frac{1}{4} = 15544\frac{8}{163} \text{ ft.} = 2 \text{ mi. } 4984\frac{8}{163} \text{ ft.}$

( 7 )

$$16\frac{1}{2} \times 3.2 \times 3.2 = 164.69 \text{ feet. } \text{Ans.}$$

( 8 )

$$16\frac{1}{2} \times 2.5 \times 2.5 = 100.53 \text{ feet. } \textit{Ans.}$$

( 9 )

$$160 \times 160 = 2 \times 32\frac{1}{2} \times \text{height.} \text{ Therefore, height} = 160 \times 160 \div 64\frac{1}{2} = 397\frac{17}{19} \text{ ft. ; } 160 = 32\frac{1}{2} \times \text{time of ascent. Therefore, time of ascent} = 160 \div 32\frac{1}{2} = 4\frac{8}{9} \text{ sec.}$$

( 10 )

$$32\frac{1}{2} \times 5 = 160\frac{1}{2} \text{ ft.} = \text{velocity of projection ; } 160\frac{1}{2} \times 160\frac{1}{2} = 64\frac{1}{2} \times \text{height. Therefore, height} = 160\frac{1}{2} \times 160\frac{1}{2} \div 64\frac{1}{2} = 402\frac{19}{23} \text{ feet.}$$

( 11 )

$$32\frac{1}{2} \times 45 = 1447.5 \text{ feet. } \textit{Ans.}$$

( 12 )

$$1970 = 32\frac{1}{2} \times \text{time of fall. Therefore, number of seconds of fall} = 1970 \div 32\frac{1}{2} = 61.24 \text{ sec.}$$

( 13 )

$$3280 = 16\frac{1}{2} \times \text{number of seconds squared. Therefore, square of number of seconds} = 3280 \div 16\frac{1}{2} = 203.9377 +. \text{ Therefore, number of seconds} = \sqrt{203.9377} = 14.28 +.$$

( 14 )

$$984 \times 984 = 2 \times 32\frac{1}{2} \times \text{height. Therefore, height} = 984 \times 984 \div 64\frac{1}{2} = 15050\frac{11}{13} \text{ feet.}$$

( 15 )

$$386 = 32\frac{1}{2} \times \text{number of seconds. Therefore, number of seconds} = 386 \div 32\frac{1}{2} = 12 : \text{ height} = 16\frac{1}{2} \times 12 \times 12 = 2316 \text{ feet.}$$

## SPECIFIC GRAVITY.

(1)

$93 - 82\frac{1}{2} = 10.5 \text{ gr.}$ , weight of an equal volume of water.

$93 \div 10.5 = 8.857 = \text{specific gravity.}$

(2)

A cubic foot of the oak must weigh 925 ounces. Therefore,  
 $925 \text{ oz.} : 2240 \times 16 \text{ oz.} :: 1 \text{ cubic foot} : 38\frac{1}{8}\frac{1}{2} \text{ cubic feet.}$

(3)

The compound weighs in air  $50 + 390 = 440 \text{ oz.}$  The weight of an equal volume of water is  $440 - 344 = 96 \text{ oz.}$  The weight of a volume of water equal to volume of the copper is  $390 - 345 = 45 \text{ oz.}$  Therefore, weight of volume of water equal to volume of the wax is  $96 - 45 = 51 \text{ oz.}$  Specific gravity of the pumice stone  $= 50 \div 51 = .980.$

(4)

Since the weight of the ice and of the displaced water are equal, we have  $20.45 \times 15.75 \times 10.5 \times .930 = 20.45 \times 15.75 \times \text{height of displaced prism of water} \times 1.026.$  Then, by cancelling,  $10.5 \times .930 = \text{height} \times 1.026$ ; hence,  $\text{height} = 10.5 \times .930 \div 1.026 = 9.517 \text{ yd.}$  Therefore,  $10.5 - 9.517 = .983 \text{ yd.} = \text{height of ice above the surface} = 2 \text{ ft. } 11.383 \text{ in.}$

(5)

$6043 \times 63 = 380709 \text{ lb.} = 190 \text{ T. } 709 \text{ lb.} = \text{weight of vessel.}$

(6)

$33 - 21 = 12 = \text{weight of an equal volume of water.}$

$33 \div 12 = 2.75 = \text{specific gravity.}$

(7)

$17 \div 2.35 = 7.234 = \text{specific gravity.}$

( 8 )

$$250 \div 318 = .786 = \text{specific gravity of the alcohol.}$$

( 9 )

$$14 - 8 = 6 = \text{weight of water ; } 13.25 - 8 = 5.25 = \text{weight of brandy ; } 5.25 \div 6 = .875 = \text{specific gravity.}$$

( 10 )

$$2.837 \times 1000 = 2837 \text{ oz.} = 177 \text{ lb. } 5 \text{ oz}$$

( 11 )

$$36.4 \div 33 = 1.103 = \text{specific gravity.}$$

( 12 )

$$\frac{1999}{1728} \text{ oz.} = \text{weight of a cubic inch of standard water.}$$

$$4 \times 3.1416 \times \text{height of mercury} \times \frac{1999}{1728} \times 13.596 = 26.2 \times 16 \text{ oz.}$$

$$\text{Therefore, height of mercury} = \frac{26.2 \times 16 \times 1728}{4 \times 3.1416 \times 1999 \times 13.596} = 4.23 \text{ in.}$$

( 13 )

$$7.55 - 5.17 = 2.38 \text{ gr.} = \text{weight of displaced water.}$$

$$7.55 - 6.35 = 1.20 \text{ gr.} = \text{ " " liquid.}$$

$$7.55 \div 2.38 = 3.172 = \text{specific gravity of alabaster.}$$

$$1.20 - 2.38 = .504 = \text{ " " liquid.}$$

( 14 )

$$\frac{1999}{1728} \text{ oz.} \times 21.5 = 12.442 \text{ oz.} = \text{weight of cubic inch of platinum.}$$

$$\frac{1999}{1728} \text{ oz.} \times 13.6 = 7.870 \text{ oz.} = \text{ " " " mercury.}$$

$$12.442 - 7.870 = 4.572 \text{ oz.} = \text{required effort.}$$

( 15 )

$$3.1416 \times 81 \times \frac{24}{3} \text{ cubic inches} = \text{volume of cone.}$$

$$3.1416 \times 81 \times \frac{24}{3} \times \frac{1999}{1728} \text{ oz.} \times 13.596 = 1418 \text{ lb. } 3.384 \text{ oz.}$$

## MARIOTTE'S LAW.

( 1 )

$$12.3lb. : 10lb. :: 4.3qt. : 3.49qt.$$

( 2 )

$$8qt. : 20qt. :: 15lb. : 37.5lb.$$

( 3 )

The density being directly proportional to the pressure, we have

$$15lb. : 14.2lb. :: 2.6gr. : 2.46gr.$$

The density being diminished, the weight is diminished in the same proportion.

( 4 )

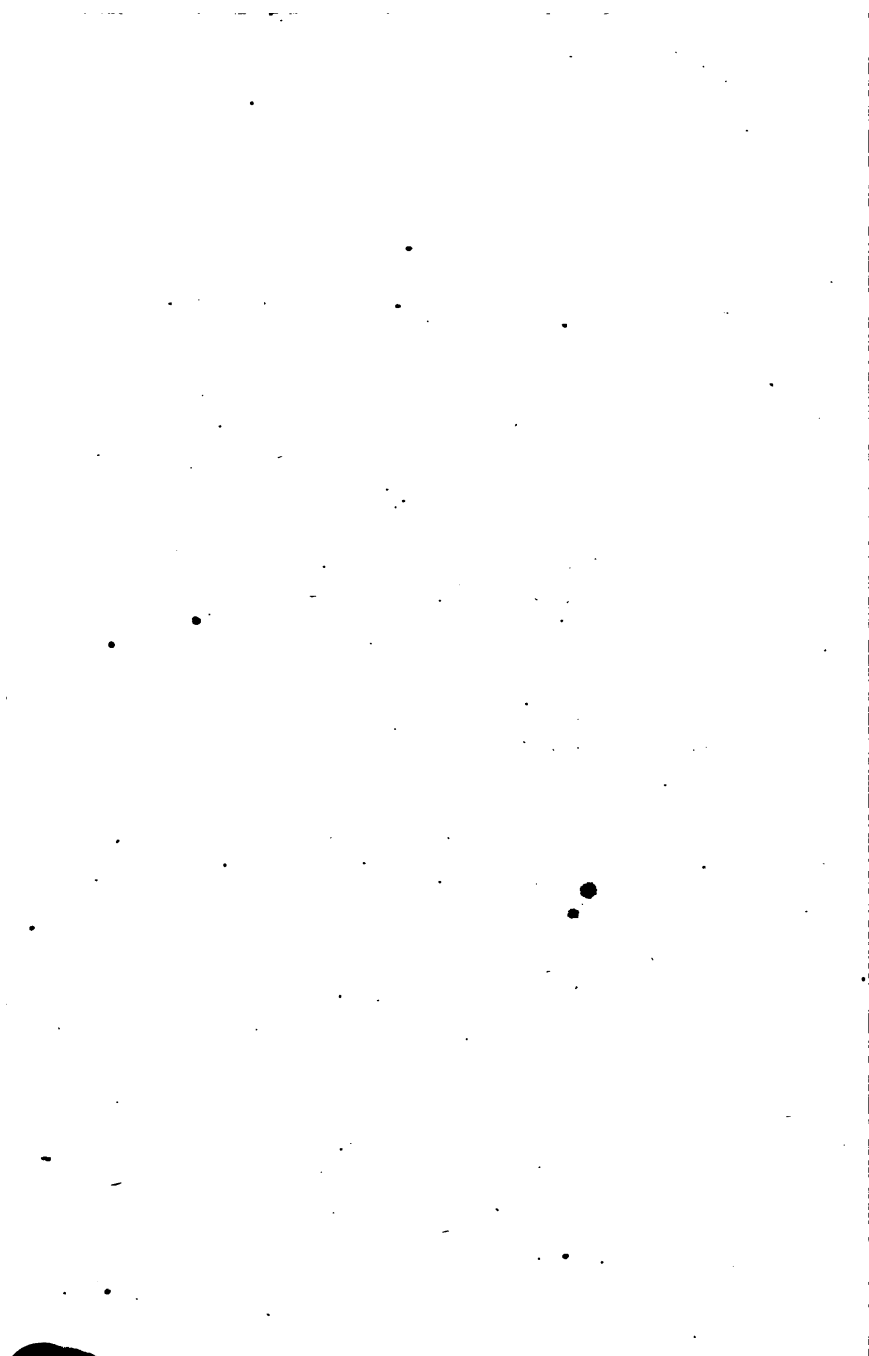
$$47lb. : 25lb. :: 1 : .5319.$$

( 5 )

$$25 : 47 :: 1 : 1.88.$$

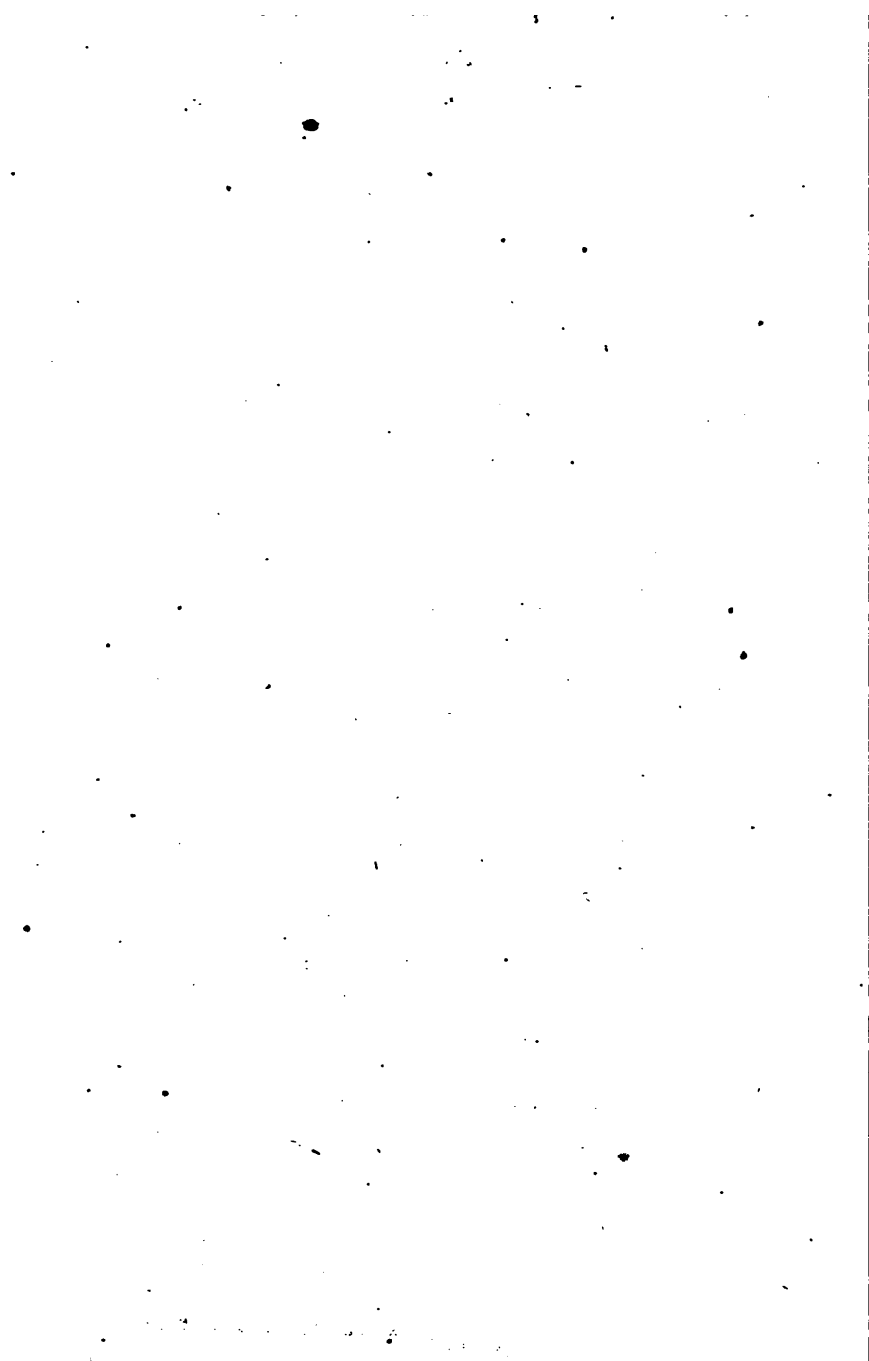
( 6 )

$$9.5lb. : 22lb. :: 8qt. : 18.526qt.$$



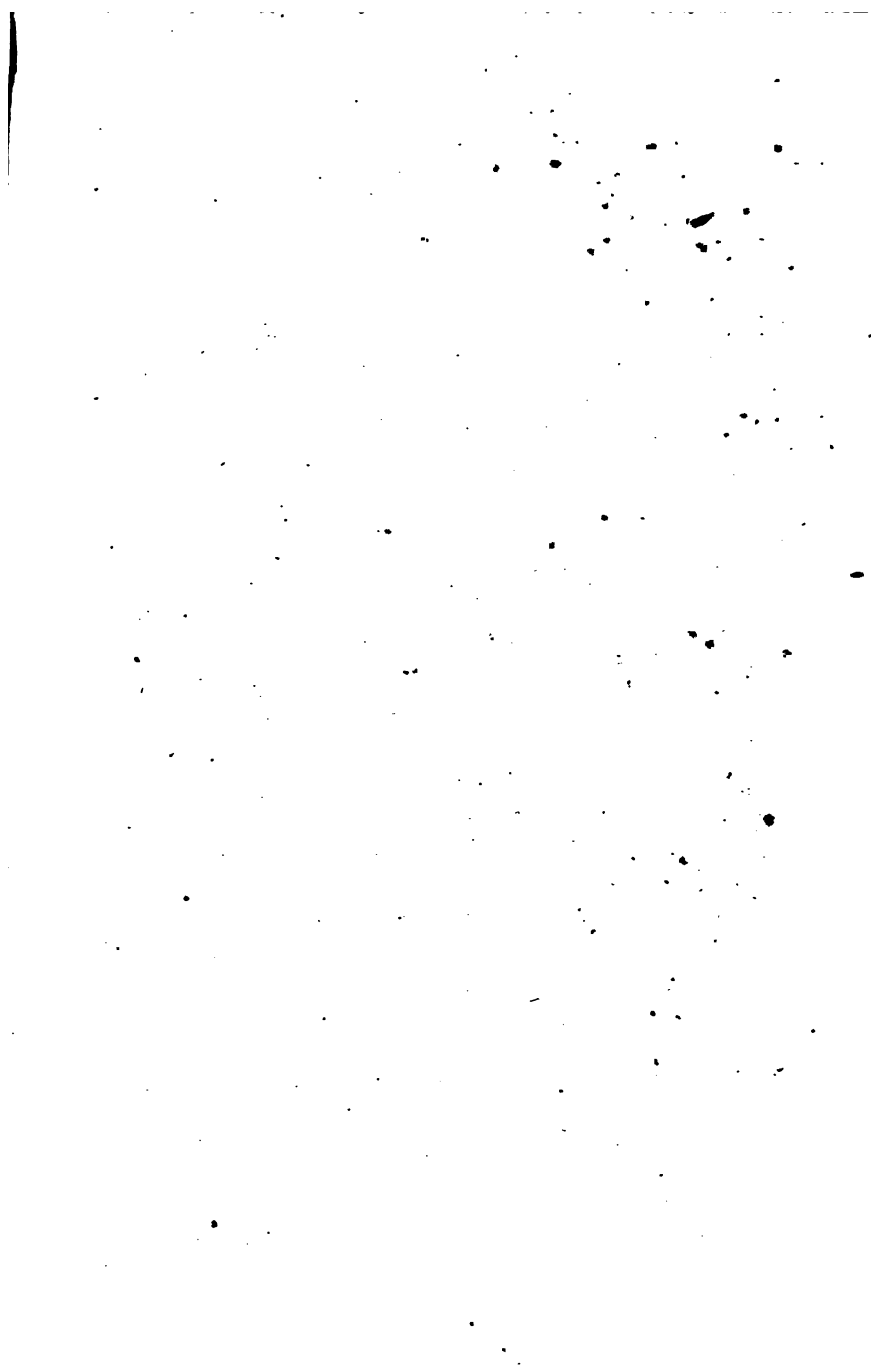








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